E.P.S Primary 4 First Term




**Name :**

**Class :**

Created by: Miss Yara Hussam

# Adaptation for Survival

## ...Lesson one...

**How living organisms protect itself from sun and hot climate?**







| **Desert lizard** | **palm tree** | **Human** |
|---|---|---|
| By finding shaded area (……………………) | covered with waxy layer (…………………..) | By using umbrella and light clothes |

These different ways to protect itself from sun or hot climate which known as **Adaptation**

**Adaptation**: They are characteristics that help living organisms to survive and reproduce in the ecosystem.

**Ecosystem**: it is an area that living and nonliving things interact with each other.

G.R: living organisms make adaptation

**...To survive and reproduce...**

**Types of adaptations**

| **Structural adaptation** | **Behavioral adaptation** |
|---|---|
| A change in the body structure of living organism | A change in the behaviors or act of living organism |

# Penguins

Adaptation of penguins to survive in cold environment



**Its habitat:** penguins live in **Antarctica.**

Polar climate (coldest place on earth)

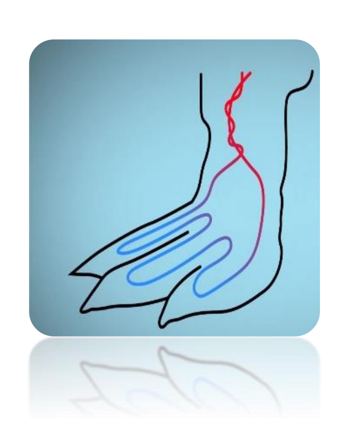
**Its adaptation:** the movement of blood.

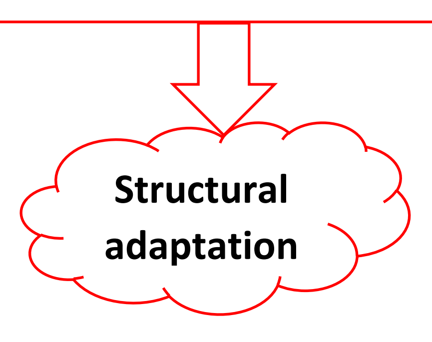
1- **Its body:** penguins have thick feathers and thick layer of fat.
((to keep its body warm))

2- **Its feet:** penguin's feet have no feathers.

why don't a penguin's feet freeze??!

**The warm blood vessels from body weave around the cold blood vessels from feet, so the heat transfers to the penguin's feet.**






There are a lot of examples of adaptation to survive, one of this example called **((camouflage)).**

**Camouflage:** it is an example of adaptation that animals hide from predators or preys, by blending in with the surrounding environment.

| Animal | | Habitat | Way of adaptation |
|---|---|---|---|
| **Polar bear** | | Arctic region | It has white thick fur<br>To keep it warm and blend in with snow to sneak up on its prey<br>(…………………………) |
| **Brown bear**<br>**Black bear** | | Forests | It has dark fur<br>to help them hide among trees during hunting.<br>(…………………………) |
| **Lizards** | | Desert<br>Between colorful rocks | It has colorful scale<br>to help them hide among rock.<br>(…………………………) |
| **Caracal**<br>**Fennec fox** | | Desert | It has sandy" TAN" fur<br>to help them hide and blend in desert,<br>Protect it from sun.<br>It has extra-large ears<br>to lose heat to cool its body, to allow excellent hearing for hunting.<br>(…………………………) |

**Fennec fox** pants like dogs to cool its body **(700 breaths per minute)** , it lives in burrows to stay cool, it eats different kind of food (insect, fruit, plant root), cause it is hard to find food in desert. (……………..)

... Class Work ...

## ***Choose the correct answer :-***

1) Penguins live in a polar climate which…………………
a. Is one of the hottest places on Earth.
b. Is one of the coldest places on Earth.
c. Looks like the desert climate.
d. Looks like the forest climate.

2) Penguin΄s feet have blood vessels that bring ………..up from its feet towards its body.
   a. Cold water
   b. Warm water
   c. cold blood
   d. warm blood

3) Bears that live in forest have fur ……………..that of polar bears.
   a. Whiter than
   b. Darker than
   c. similar to
   d. brighter than

4) Desert lizards have…………. That make them hide among the colorful rocks in the desert.
   a. Tan-colored fur
   b. Colored scales
   c. sandy colored feathers
   d. dark fur

5) Adaptation helps the living organism in all the following characters except……….
   a. Surviving
   b. Reproduction
   c. death
   d. hiding

## ***Give reasons for*** 😊

Fennec fox has sandy-colored fur, while polar bear has a white fur.

………………………………………………………………………………………………………..

## ***What happens if ...?***

The warm blood vessels and cold blood vessels in the penguin΄s

Feet do not weave around each other.

# ...Home work...

## Put (True) or (False) :-\

1. The desert lizard blend in with large green trees to hide. (   )
2. Animals that live in hot desert have special ways to keep their bodies cool during hot sunny days. (   )
3. Living organisms can survive and reproduce in different environment by the help of adaptation. (   )

## *Write the scientific term :^*

1. A characteristic that helps living organisms to survive and reproduce in the ecosystem. (                    )
2. A property that helps animals to blend in with their surrounding environment. (                    )
3. A type of foxes that has sandy-colored fur to adapt its desert environment. (                    )

## *Give reasons for…?*

1. The starred agama lizard always looking for shade areas in desert.

   ……………………………………………………………………………………………………

2. Some desert lizards have colorful scales.

   ……………………………………………………………………………………………………

3. Some animals have the ability to make camouflage adaptation.

   ……………………………………………………………………………………………………

## *What happens if ….?*

1. The body of fennec fox is covered with black fur.

   ……………………………………………………………………………………………………

2. Forest bears are coated with white fur.

   ……………………………………………………………………………………………………

3. Some types of lizards aren´t able to make camouflage adaptation.

## …lesson two…

## Arctic fox

**Its Habitat: Live in tundra desert**

**Temperature : it is 50 below zero in winter months**





### Structural adaptation

It has thick fur coat; to keep its body warm.

It has white fur in winter- brown in summer; to hide from preys in any season.

It has short ears and legs; to help it stay warm, to allow excellent hearing for hunting.

### Behavior adaptation

It lives in burrows; to stay warm.

It eats different kind of food ( insect, fruit, plant root, prey remain) because it hard to find food in desert.

- Changing the color of body coat of arctic fox according to season, is considered as a type of………………

a. Behavioral adaptation b. structural adaptation

**What happen if Arctic fox has long ears?**

# Bull shark

**Its Habitat:** lives in fresh water and sait water.

## Structural adaptation:



It has dark back and white belly; to hunt its prey.

- Use a camouflage strategy called **(countershading).**

It has sharp teeth to cut its prey's flesh.

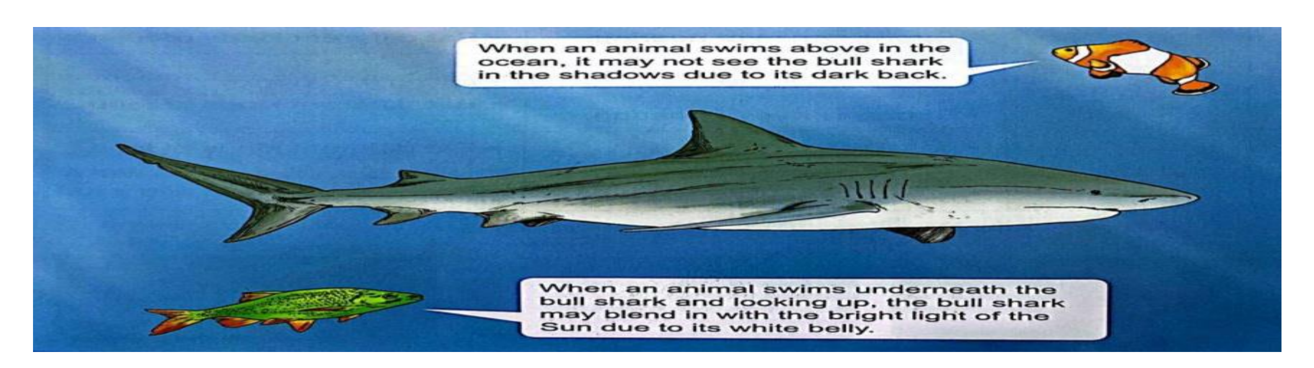
## Behavior adaptation:



It eats different types of food;

as it can hunt in fresh and sait water.

It hunts in the day and the night; so it can surprise its prey.




- Write the scientific term😊
  - A feature in the bull shark, in which the upper surface of its body is darker than its lower surface. (……………………………….)
- Complete😊
  - The chance of bull shark to find a prey is more easier in………..water than in………water.
  - Living of bull shark in both salt and fresh water is …………… adaptation.

# Panther chameleon



**Its habitat:** lives in tropical rainforest.

## Structural adaptation:

- It has bright colored scales;
  to camoufalge in its environment.
- Its eyes can move in opposite directions:
  **One eye search for food while other eye to avoid danger.**
- It has v-shaped feet and a tail like a hand (coiled tail);
  to hold tightly the branches of tree.
- It has very long sticky tongue;
  to hunt insects for feeding.

## Behavior adaptation:

In danger it scare its attackers by;

- It puff up its body with air.
- It opens its mouth wide.
- It changes scales color.







- When a panther chameleon stands within leaves of trees, the color of its scales changes into……….. color.
  1. White b. green c. blue d. black
- Chameleon uses its tail and V-shaped feet to hunt and move.( )

# Plant adaptation

| Plant | Habitat | Structural adaptation | Reason |
| --- | --- | --- | --- |
| Water lily | Wetland Fresh water | It has wide floating leaves. | To absorb sunlight. |
| Mangrove tree | Salt water | It has long and strong roots. | To resist waves. |
| Palm tree | Desert | It has thick roots and small leaves. | To resist strong winds. |
| Pine tree | Snow | It has a triangular shape and short branches.<br><br>It has needle leaves. | To allow snow to slide easily over it without breaking branches.<br><br>To prevent lossing water. |
| Barbary fig | Desert | It has sharp spines. | To prevent animals from eating its leaves and fruits. |

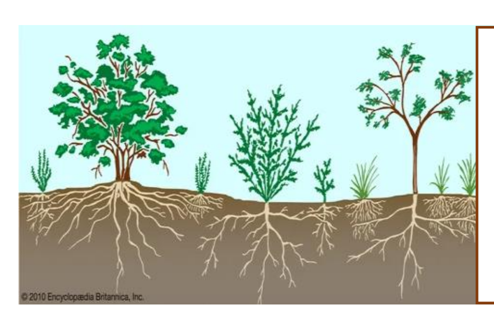
**Adaptation of two different big trees to survive in their environment:)**

1) **Acacia tree: (umbrella-shaped tree)**

Habitat: ..southern african savannah..

- It's a grassland habitat with a mild temperature.
- It has extreme lack of water during summer.

Structural adaptation:



**Root**

It has very long roots called taproot grows directly downward?

To search for water in deep soil.



**Trunk**

the trunk stores water as the hump in camel.

A very long trunk so giraffe only can reach its leaves.



**leaves**

It has tiny leaves on top to hold water.

It has sharp spines to protect it from

Behavioral adaptation:

Acacia tree defends itself by:

Produce a poison when animal eats its leaves to keep animal away.

Send bad smelly message in wind to near tree to produce same poison.

## 2) Kapok tree: (umbrella-shaped tree)

Habitat: ..Amazon rainforest in Brazil..

- Rainy most of year, so it's easy to find water.
- It has strong winds.

Structural adaptation: )



**Root**

It has large wide roots (buttress roots).

Roots grow up around trunk, to hold the tree firmly. (soggy soil) (wet muddy soil) .



**Leaves**

It has hand-shaped leaves with narrow parts, to allow wind move without cutting.

**Seeds**



Fluffy yellow light seeds, easily to carry by the wind.

Behavioral adaptation:

It sends messages by wind to attract bats to its delicious smelly flower.

# ...Class Work...

## Choose 😋

1. One of the behavioral adaptation of acacia tree is that........
   a. It has one very long root.
   b. It has sharp spines around its leaves.
   c. it produces a poison to make bad tasty leaves.
   d. it has very tall trunk.
2. The acacia tree warns the other nearby acacia trees from animals by sending.........
   a. A Watery message in the air c. A watery message in the water
   b. A smelly message in the air d. A smelly message in the water
3. The roots of kapok tree are not planted deeply in the soil, cause...
   a. The soil contains less water c. the climate is very cold
   b. The soil contains more water d. the climate is very hot
4. One of the structural adaptation of water lily plant is that........
   a. It has long roots c. it has wide leaves
   b. It has tiny leaves d. it has sharp spines
5. Barbary fig keeps animals away like acacia trees by its...........
   a. Sharp spines b. Smell c. Poison d. long leaves

## Match

| A | B |
|---|---|
| 1. Long and strong root<br>2. wide leave<br>3. chameleon<br>4. Bull shark<br>5. Needle shaped leaves | a. It has eyes face opposite directions.<br>b. It has dark back and white belly.<br>c. It makes mangrove tree resists the water waves.<br>d. It allows lilies absorb large amount of sunlight.<br>e. Prevent the loss of water in pine tree. |

# ...Home work...

## Put (True) or (False) :-

1. The ears of arctic fox are larger than those of fennec fox. ( )
2. Fennec fox stays in burrows during day, while arctic fox stays in burrows at night. ( )
3. All types of sharks live in fresh water. ( )
4. Plants have structural adaptation only to help them survive and grow in different environments. ( )
5. Hand-shaped leaves of kapok tree is considered as a behavioral adaptation. ( )
6. One of the structural adaptation of acacia tree is that it has large, wide roots called butterss roots. ( )
7. Mangrove trees adapt to resist the water waves through their long, strong roots. ( )

## Give reasons for…?

1. Wind is important to acacia tree.

   ……………………………………………………………………………………………………
2. Kapok trees stay firmly rooted in the soggy soil although they are very tall.

   ……………………………………………………………………………………………………
3. Water lilies have wide floating leaves.

   ……………………………………………………………………………………………………

## What happens if …?

1. Arctic fox has only a white coat during all seasons of the year.

   …………………………………………………………………………………………………
2. Both eyes of panther chameleon move in one direction only.

   …………………………………………………………………………………………………
3. The length of acacia taproot does not exceed 3 meters downward.

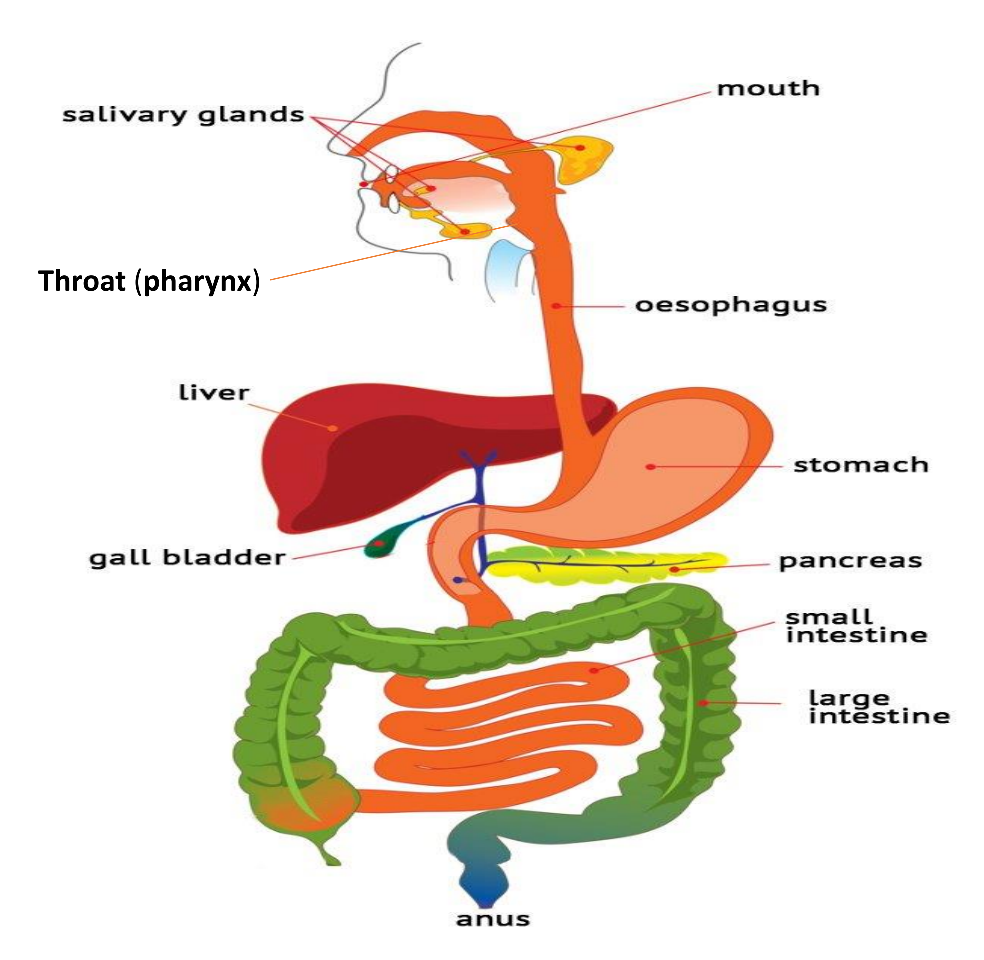
# …Lesson three…

## Digestive system

**System:** it's a group of organs that work together to perform a specific job.

Digestive process

**Digestive system:** breaks food into smaller parts that body use it to get energy and grow.




Human digestive system

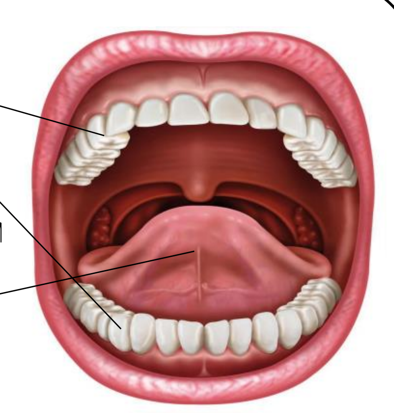
Digestive system starts with **mouth** and ends with **anus**.

Digestive system consists of group of organs that work together

- mouth
- Throat (pharynx)
- esophagus
- stomach
- Small intestine
- Large intestine

## Mouth

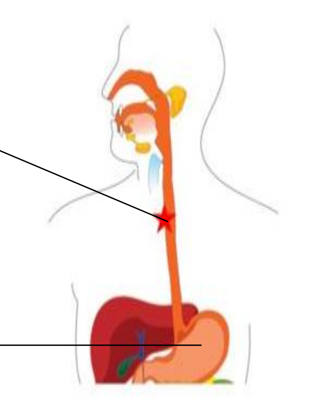
Digestion process start in mouth.
Mouth contains:
Teeth : they crush food during chewing.
Saliva : 1- it's a liquid in the mouth.
2- it moistens food and begins to break it down
Tongue : mix food with saliva.




**Function of saliva:**
Help the swallowing of food – Digest starch into sugar.

## esophagus

It is a long muscular tube.
**Function**:
It moves the food from throat down into stomach.



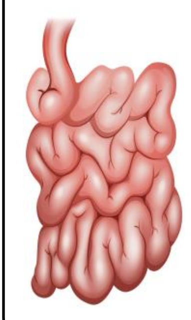

## Stomach



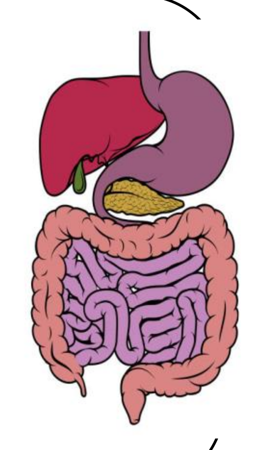
It is a muscular organ.
**Function:**
It mixes food with stomach acid to get soupy liquid.
Food stay in stomach then move to small intestine.



## Small intestine



A long winding tube with length more than 6 meter.
The juices of pancreas and liver flow into small intestine
To help in breaking food into nutrients.
A tiny blood vessels carry nutrients to all body parts.
**Function:**
Complete digestion of food – absorb nutrients.



## Large intestine



A tube starts from end of small intestine
ends with anus.
Function:
Absorb water from wastes to be solid to leave body through anus.

**No digestion process in large intestine…**

### …Class Work …

**What happens if**

1. one of the organs of digestive system is absent?

………………………………………………………………………………………………………

2. The small intestine was not supplied with blood vessels in human body.

………………………………………………………………………………………………………

**Give reasons for ☺**

1. Anus is an important organ in the digestive system.

   ………………………………………………………………………………………………

2. Saliva is very important in your mouth.

   ………………………………………………………………………………………………

**Write the scientific term ☺**

1. A group of organs work together to perform a specific job. ( )
2. The organ, where the digestion process begins. ( )
3. They present in the mouth and play an important role in crushing of food. ( )
4. A liquid substance in your mouth that moisten the bite of food and begins to break it down. ( )

**Choose:-** (stomach- large intestine- digestive system- pancreas-
. stomach acid and digestive juices)

1. The stomach mixes the food with ……………to help in digestion of food.
2. A system that breaks down food into smaller parts…………………… .
3. It absorbs water from the undigested materials……………………… .
4. …………………… Is a muscular organ.
5. The liver and ………………… Pour their juices into the small intestine.

# Respiratory system

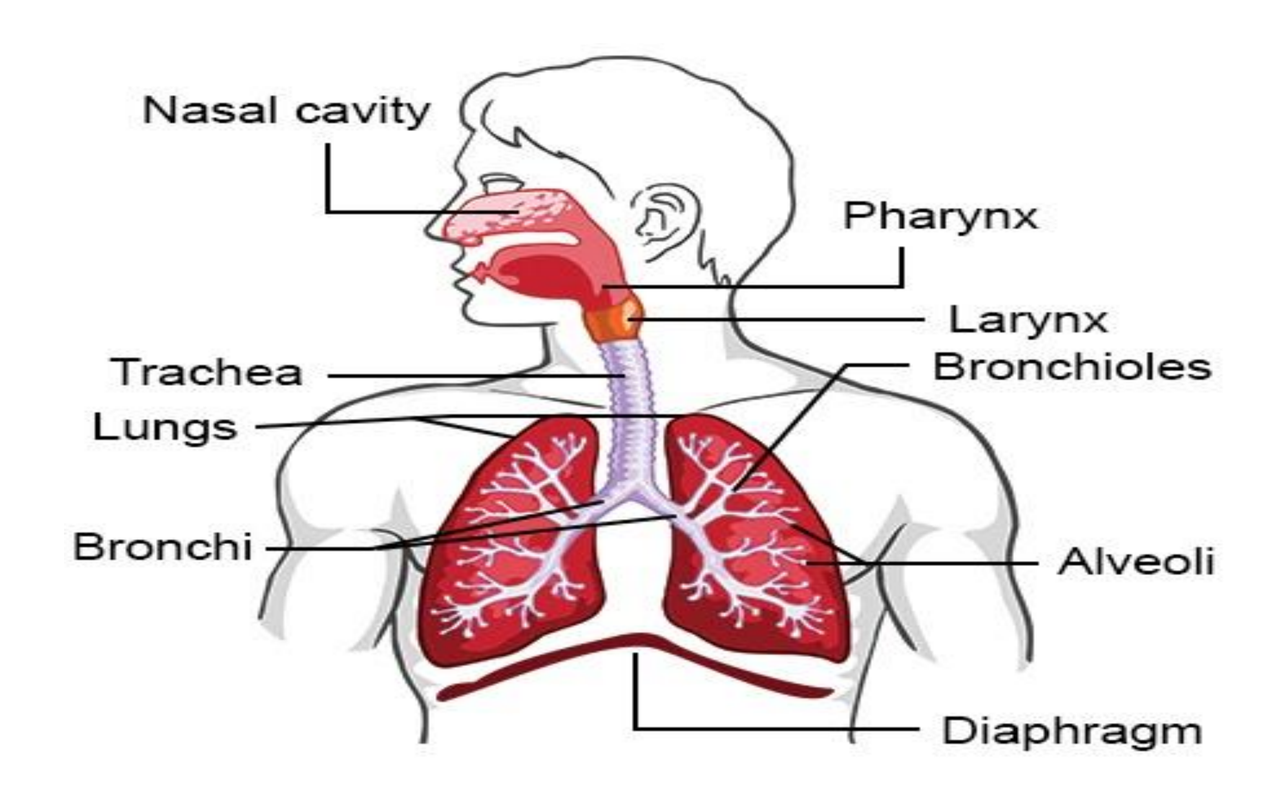
A system is responsible for breathing ( respiration).

## Respiratory process

It is a process of pulling air in (inhalation) and pushing air out (exhalation) of the body.

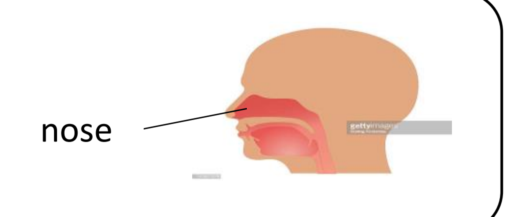
**The human respiratory system consists of**

- Nose
- Trachea
- Two lungs
- Throat (pharynx)
- Two bronchi
- Diaphragm



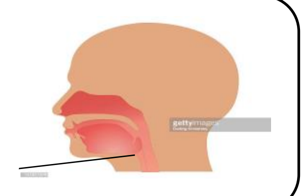
## Nose

It is the first organ of respiratory system
Air enter our body through nose.




## Throat

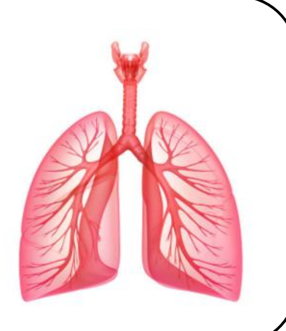
It allow air to pass from nose to trachea



Throat

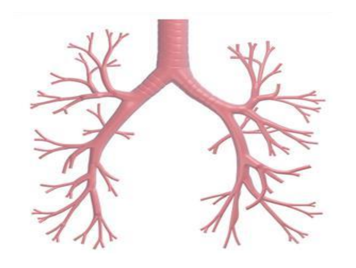
## Trachea

A tube allows air to pass into lungs,
which fill up with air like balloons.
Inside lungs trachea is branched into two tubes
Two bronchi.



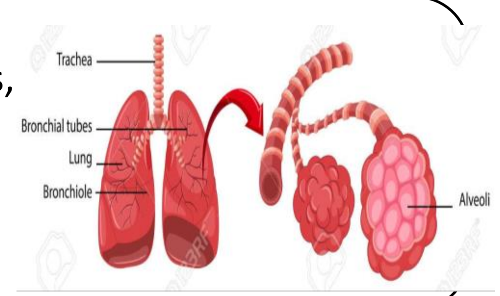
## Two bronchi

Allow air to enter the lungs.
Divided into smaller and smaller tube
like branches of tree called **Bronchioles**.



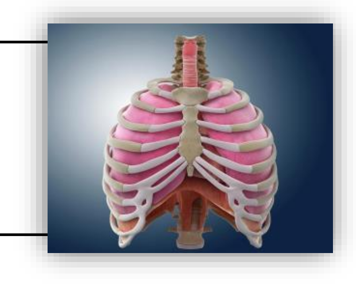
## Two lungs

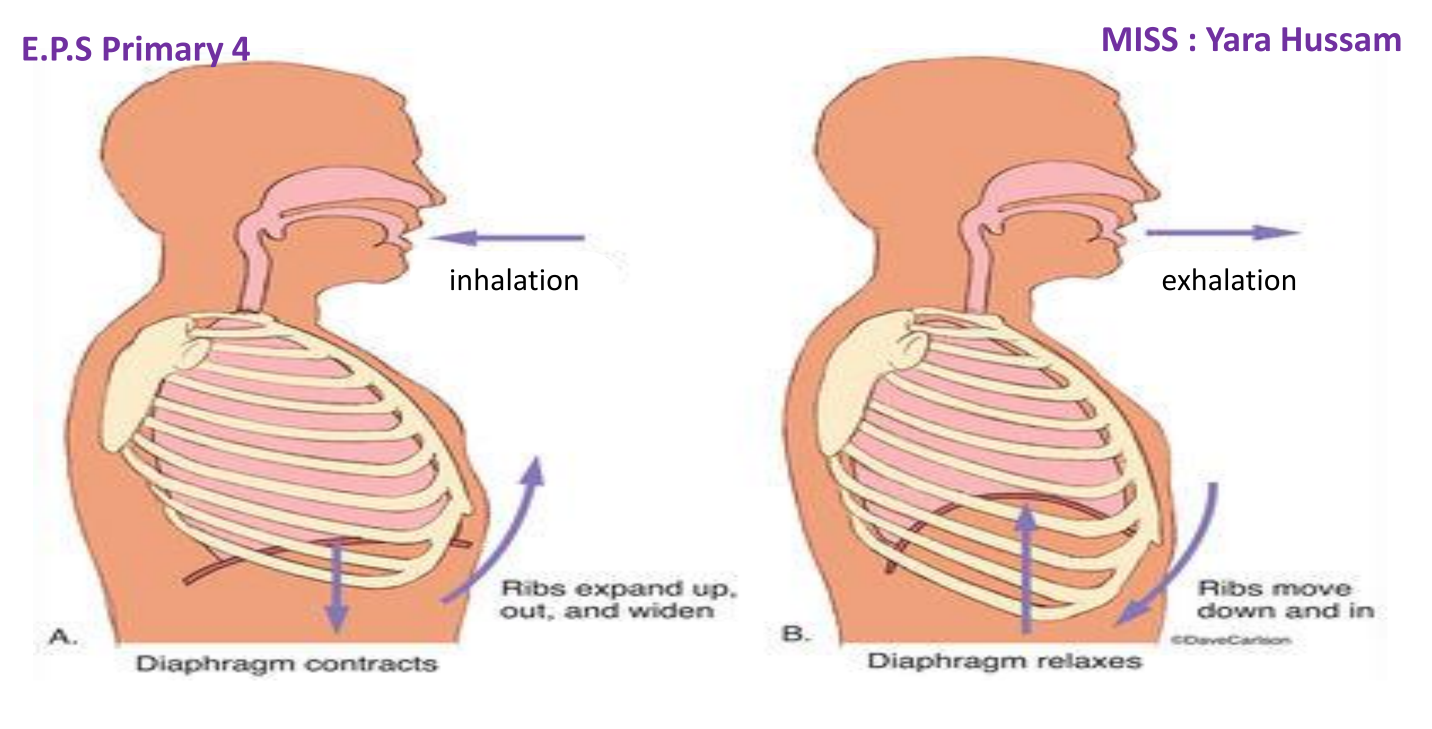
**Inside lungs**, bronchioles end with small air sacs,
surrounded by blood vessels called **alveoli.**
**Inside blood vessels**, oxygen moves into blood
To help other organs and system to work.



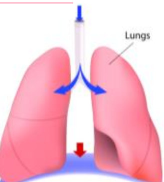

## Diaphragm

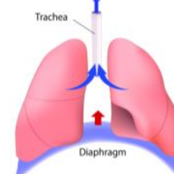
It's a large muscle that play important role in
Inhalation and exhalation.






Diaphragm contracts down to enter oxygen and chest increase.

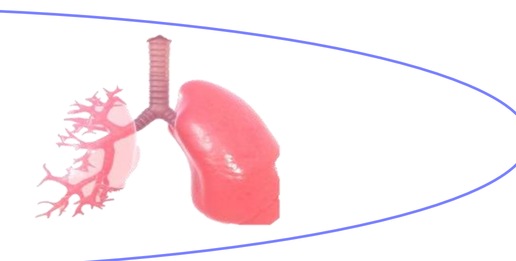



Diaphragm relax upward to get carbon dioxide out and chest size decrease.

**How can you keep respiratory system healthy?**

1. Breathing clean air.
2. Eating fruits rich in vitamin **c** .
3. Avoiding smoking.



## …Class work …

**Choose ☺**

| (A) | (B) |
|---|---|
| 1. Trachea<br>2. Blood<br>3. Diaphragm<br>4. Lungs<br>5. Nose | a. Air enters the body through them<br>b. Is a large muscle at the base of the ribs and helps in inhalation and exhalation.<br>c. Are like balloons and they contain little sacs surrounded by blood vessels.<br>d. Carries oxygen to all the body organs.<br>e. Is a tube through which air travels down into the lungs. |

**Give reason :** Diaphragm plays an important role in respiration process.

……………………………………………………………………………………………………

## ….Home work…

### Put (True) or (False):-

1. During exhalation, the diaphragm expands. ( )
2. Food passes from mouth to stomach through a narrow tube known as small intestine. ( )
3. The inhaled air is rich in carbon dioxide gas, while the exhaled air is rich in oxygen gas. ( )

### What happens if …?

1. The diaphragm moves downward during inhalation.

……………………………………………………………………………………………………………

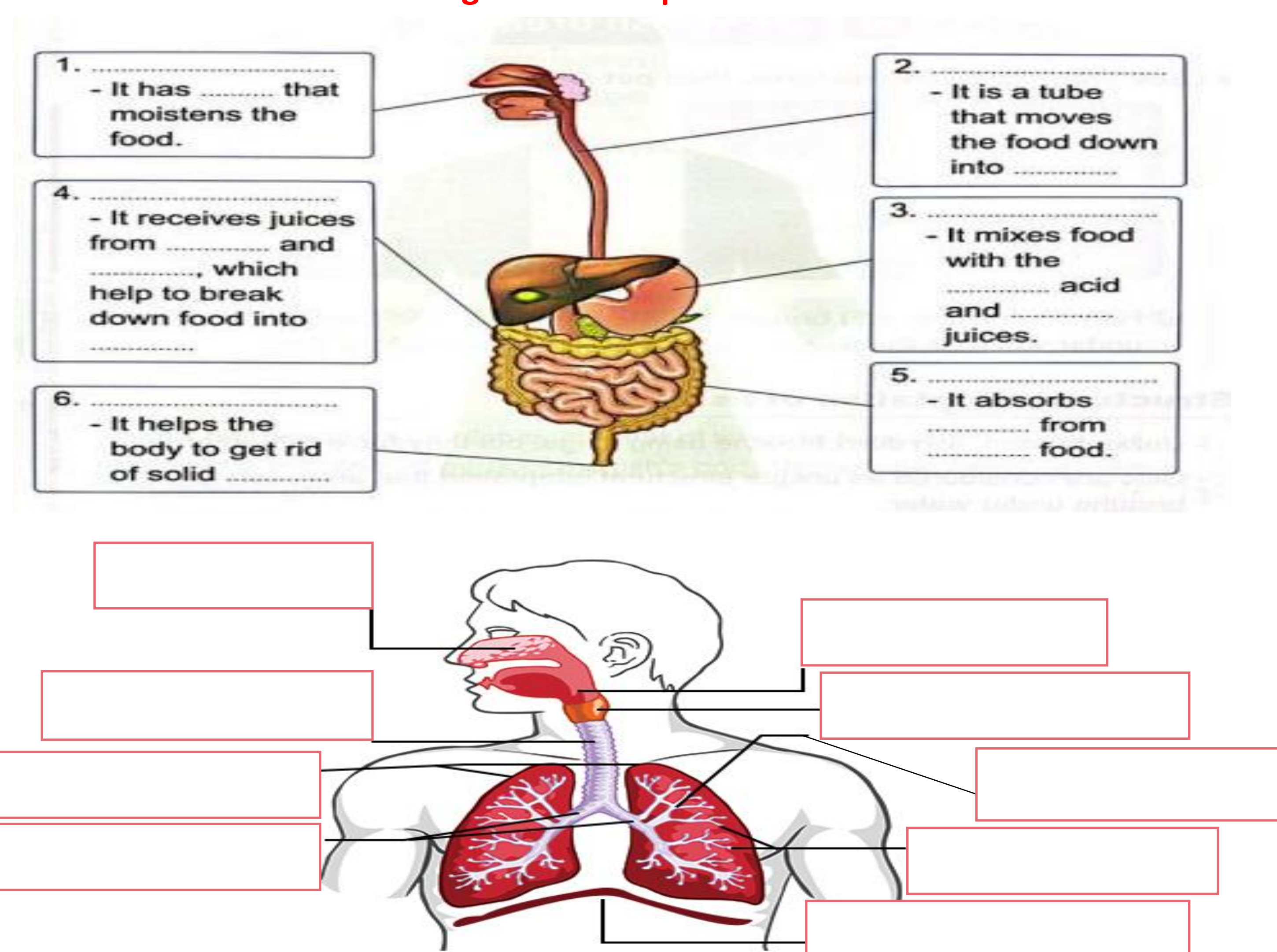
2. The small intestine is removed from the human body.

……………………………………………………………………………………………………………

### Cross the odd word:-

1. Mouth – lungs – stomach – large intestine. (………………………)
2. Nose – Throat – Trachea – Anus. (………………………)

### Mention the name of each organ and complete ☺



# ...Lesson Four...

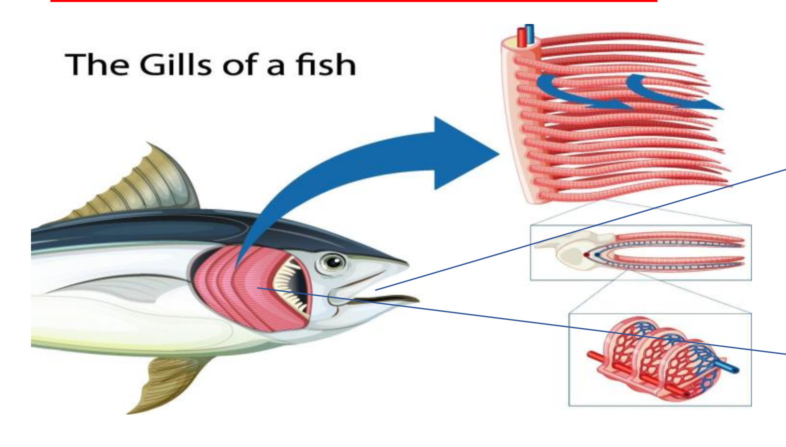
## How Fish Breathe

1. Human can stay and breathe under water all time. (        )
2. Fish can stay and breathe under water all time. (        )

### Structural adaptation of fish:

- Human have lungs to breathe, But fish have Gills to breathe.
- Gills are unique structural adaptation that allow fish to live and breathe under water.
- Gills are found on both sides of a fish's head.

**How do fish breathe under water?**




Water enters from mouth and passes to **Gills**

Blood vessels inside Gills carry oxygen to rest of body and release carbon dioxide.

## Human change the environment

Human activities change the ecosystem over time, so organisms will have to adapt to survive.

Human activities



1) Cutting down forests.



2) Farming and clearing lands.



3) Building communities instead of grassland.

4) Put plants and animals in environment That Were never part of the ecosystem.

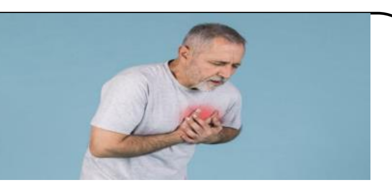
5) Water pollution.

6) air pollution

## Human activities also have bad effects on human such as:


1. Damage of lungs


2. Asthma (breathing difficulty)


3. Heart diseases

Water pollution makes hard to find clean drinking water.
Ari, water, soil pollution make crops cannot grow.
Air pollution (smog) make us hard to breathe.
People live in big city must change their lifestyle to avoid air pollution.

**Human roles to help restore ecosystem:**

1. Replanting the cleared forest.
2. Removing the pollutants of water and air.
3. ………………………………………………………………

## ...Class Work ...

*Choose ☺*

| (A) | (B) |
|---|---|
| 1. Changes that done by human and may harm existed birds in an ecosystem are. | a. Building more factories that produce more smog inside cities. |
| 2. Changes that done by human and cause air pollution are | b. Rainfall, floods and severe weather events. |
| 3. Changes that done by human and can restore air in an ecosystem are | c. Replanting the cleared forests and removing of air pollutants. |
| | d. Clearing lands and cutting down forests. |

Choose ( use oxygen gas to breathe in – gills – structural adaptation – extract oxygen gas from water )

1. Gills in fish are considered as …………………………………… .
2. Fish use …………. To breathe in water.
3. Both of human and fish ……………………………………………… .
4. Gills differ from lungs, in that gills ……………………………… .

# …Home work…

## Write the scientific term :-3

1. A gas presents in air and water, and is very important for breathing process. (…………………)
2. A kind of pollution that is caused due to throwing waste materials into the waterways and soil. (…………………..)
3. A kind of pollution that is caused due to the exhausts from cars and some factories. (……………………..)

## What happens if …?

1. Human activities and bad habits increases.

………………………………………………………………………………………………………………

2. Water pollution increases. (for human and fish).

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

3. The ecosystem is rapidly changed.

…………………………………………………………………………………………………………………

## Give reasons for …?

1. Gills are unique structural adaptation in fish.

………………………………………………………………………………………………………………..

2. Car and factories exhausts cause breathing problems.

………………………………………………………………………………………………………………..

3. Sometimes people in big cities are forced to change their lifestyle.

…………………………………………………………………………………………………………………

4. Although the air, water and soil get polluted as a result of human activities, plants and animals can survive.

…………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………

## …Lesson five…

## Amphibians

In this lesson, we are going to study **Amphibians,** one of most amazing living organisms

They are small animals that live on land and water:



Salamanders



Toads



Frogs

They can live in moist (wet) environments like rainforests, streams, ponds.

### Structural adaptation

| Breathe on land ( lungs ) | Breathe on water ( skin ) |
|---|---|
| It inhale oxygen from air through lungs. | It can extract oxygen from water, Using skin. |

Amphibians need clean air and water to stay healthy, cause they are sensitive from:

1. air pollution. 2. water pollution. 3. viruses in water.

Golden frog from endangered species

<u>The role of scientists to protect Amphibians from extinction:</u>

Factors cause **air** and **water** pollution that affect life of amphibians.

Protection of amphibians from extinction:

1) Avoid throwing waste materials in water.
2) Dispose of chemical in a correct way, to avoid water pollution.

**Write the scientific term of each of the following ;-)**

1. Species that include frog, toads and salamanders. ( )
2. The organ through which salamanders can take in oxygen gas directly. ( )
3. A gas presents in water and air that living organisms breathe in during respiration. ( )
4. The type of adaptation that allows frog to take in oxygen gas from water directly through the skin. ( )
5. A respiratory organ that contains little sacs, and found in human, frogs and cows but not in fish. ( )

**Choose the correct answer :-**

1-amphibians are adapted to live in …………….that suits their adaptation
A-dry environment b-moist environment
C-arctic environment d-sandy environment

2-if amphibians have gills and they don't have lungs and also cant respire through skin , then……………….
A-they cannot live outside water b-they can live outside water
C-they cant live under water d-they can live in desert landscape

3-amphibians can take in oxygen gas from ………………..
A-water only b-air only
C-food and air d-water and air

4-blood vessels that carry oxygen in amphibians, present in……………
A-skin and digestive b-lungs and eyes
C-digestive system d-skin and lungs

5-amphibians, lizards , trees, birds ,fish and humans……………………
A-some of them need oxygen gas to respire
B-some of them carbon dioxide gas to respire
C-all of them need oxygen gas to respire
D-all of them need carbon dioxide gas to respire
How do people help in protection of amphibians from extinction?
1)……………………………………………………………………………………………………………
2)……………………………………………………………………………………………………………

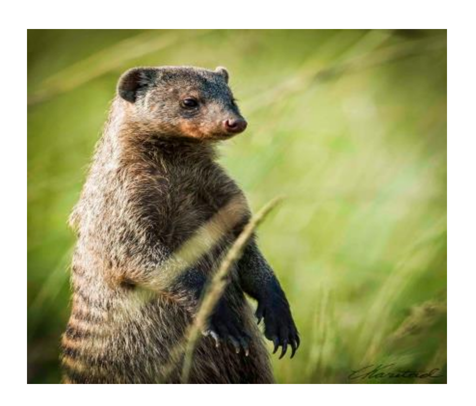
# …Unit (1) Concept (2)…

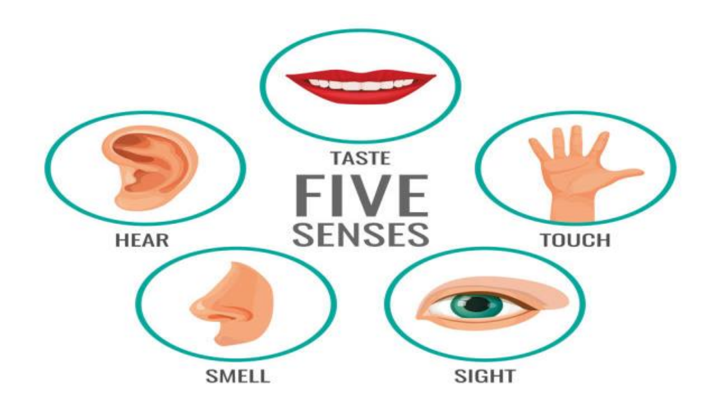
## …lesson one…

## Senses at work

Animals have senses like humans (sight, hearing, smelling, touching, tasting) and some animals have sharper sense that enable them to communicate with each other and adapt to their surrounding environments.

Ex: **the Egyptian Mongoose:** makes sounds to communicate with each other to move from place to another or for searching for food.





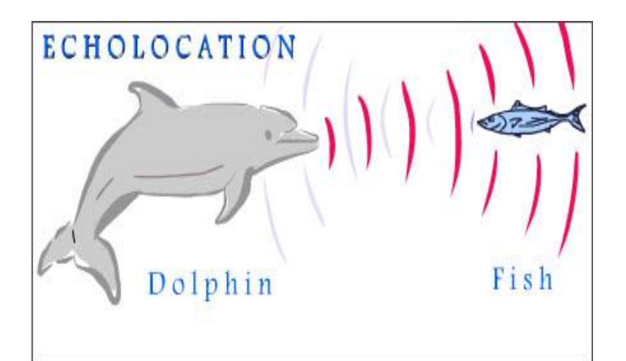

### Dolphin senses

Dolphins have super senses help them:

1. Survive 2. finding food 3. protect themselves under water

How can dolphin locate organisms under water?

Dolphin use sense called **echolocation** to locate objects or preys.




**Echo:** is the bouncing back of sound waves when they hit object

1. Dolphin produces sound wave that travel through water.
2. These waves hit objects then bounce back to dolphin in the form of echo.
3. Echo helps dolphin to locate its prey or objects.

## what do you already know about senses at work?

### Animal perceptions

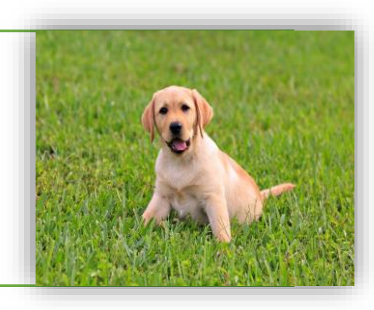
*fox:*
**The purpose:** Avoiding danger.
**The uses:** Hearing and sight.





*Chameleon:*
**The purpose:** Finding food.
**The uses:** Sight and taste.

*Dog:*
**the purpose:** Recognizing friends.
**The uses:** smell and sight.





*Monkey:*
**The purpose:** Identifying objects.
**The uses:** touch, smell, sight, taste, hearing.

## ...Class Work...

**Put (True) or (False) :-^**

1. A human can identify music through ears which are the organs of sight. ( )
2. The Egyptian mongoose can communication with its species by making sound. ( )
3. The sense of hearing of dolphins is stronger than that of human. ( )
4. Skin helps human distinguish between the taste of different types of food through the sense of touch. ( )

# …Home Work…

## Correct the underlined words:

1. The dolphin has sharp sense of touch. (                    )
2. The fox uses its tail and ears to run away when it sees or hears its enemies. (                    )

3. The dog uses its eyes to recognize odor of humans. (                    )

## Give reasons for :-

1. Owls can hunt during the night.

……………………………………………………………………………………………………………

2. The Egyptian mongoose make sounds.

……………………………………………………………………………………………………………

3. Dolphins can hear all kinds of sound.

……………………………………………………………………………………………………………

4. Dogs are used in guarding.

……………………………………………………………………………………………………………

## Complete:0

1. A human can pay attention to an alarm bell in case of danger through the sense of …………………… .
2. Dolphins have sharp sense of ……………., which they use to locate living organisms under water through the ……………… .
3. The five senses of humans and animals are …….., ……….., …….., ………., …….. .
4. We can distinguish between water and milk through …………, ……………. .

## Arrange the following steps:-?

(    ) The sound waves travel and hit the prey, then bounce back to the dolphin in the form of an echo.

(    ) The echo helps the dolphin locate its prey.

(    ) The sound produced by a dolphin is transmitted in the form of waves called sound waves.

→ what happens when the sound waves produced by a dolphin hit an object under water?

………………………………………………………………………………………………………………

………………………………………………………………………………………………………………

# ...lesson two...

## Sensory Organs of Nocturnal Animal

1. Human can see everything clearly inside a dark room. ( )
2. An owl can see its prey in the dark during nighttime. ( )

You can hear the sound or noise in darkness, but you can't see clearly. Some animals known as "Nocturnal animals" using their super senses, to look for their food at night.

***Nocturnal animals:***
They are animals that become active at night to look for their food.

Why do some animals become active at night?

1. The best time to look for food is nighttime, it's cooler than at morning.
2. Some food only available at night.
3. Some animals hide from their preys in darkness and surprise them.

How can nocturnal animals hunt without much available light?

***Super sensory adaptations*** allow nocturnal animal to navigate safely and find food in dark, Examples:

- ***Bats*** depend on echolocation to find food.

***Purpose:***
To help bats move around and find food (preys) at night.




Owl have very sharp sight and hearing senses.

***owl's face:***
it has a bowl-shaped face with special feathers. ***G.R***
To direct distant sound into the owl's ears.

***owl's large eyes:*** allow it to see tiny and far-away movements of preys.

***Owl's head:*** Has the ability to turn in all directions. ***G.R***
To search for preys everywhere.

***Purpose:***
To detect the movements and sounds of tiny distant preys.



Owls

# The Nervous System

Senses work together with the nervous system to get information from environment

*the nervous system consists of:-*

1. The brain 2. The spinal cord 3. Nerves

## The brain

It is connected to the spinal cord.

***Its function:***

It is the main control center in the body.

## The spinal cord

It is a big nerve runs through the backbone.
It is branched into smaller nerves.

***Its function:***

It carries messages from brain to body parts and vice versa.

## Nerves

Nerves are distributed through body and connect the sense organs and body parts with brain.

***function:***

They carry messages from brain to spinal cord and other body parts and vice versa.

!!!! **some nerves are connected directly to the brain like the nerves of eyes.**

- The nerves transmit information from the sensory organs to the brain.
- The five sensory organs contain a special type of nerves called sensory receptors.

***Sensory receptors:-***

They are nerves found in different parts of the body that are responsible for receiving information from the environment.

How dose the nervous system work if you smell pizza?

1. The sense organ (nose) receives the information from the environment (pizza's odor).
2. The sensory receptors of smell that are found in the back of nose send specific signals along the nerves to brain.
3. When the information about smell reaches brain, the brain processes that information and determines the type of food.




## Sensing the Environment

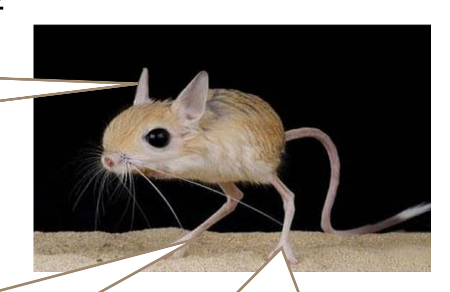
***Jumping jerboa:***

The Egyptian jerboa is a **desert rodent.**
It searches for food at night.

**Jerboa adaptation to the environment:**

*Structural adaptation*

Jerboa has **large** and **sensitive ears**, so he can detect even a quiet snake.





*Behavioral adaptation*

jerboa's **feet and toes have hair** to help it grip sand when it hops and jumps.
It hops in **zigzag patterns**, so it can escape quickly from danger

Jerboa has **long hind legs** that enable it to jump a long distance.

*Structural adaptation*

How do all parts of jerboa's body work together to avoid danger?

When a snake makes noise as it comes near a jerboa to hunt it:

1. The sensory receptor in jerboa's ears send a message through a network of nerves to its brain.
2. The jerboa's brain translates this message and alerts its leg to move.
3. jerboa's strong hopping legs start to jump away from the danger in zigzag paths.

jerboa's sense work together with its nervous system to survive.

## Reaction time

It is the time taken by an organism's body to react to different information around it.

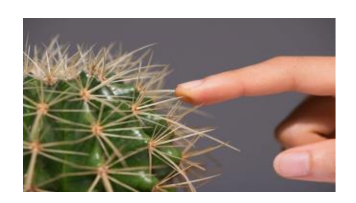
*Common things between humans and jerboas!!*

- Both human and jerboa avoid danger by relying on sensory receptors, nerves and a brain to sense and communicate messages.
- Both human and jerboa move quickly away from danger for their safety.

**Examples:**



- Jerboa hops in zigzag patterns,
So it can escape quickly from danger.



- Human moves quickly his hand away,
When it touches cactus's spines.

## …Class Work…

**Write the scientific term :-**

1. A group of different animals that look for their preys at night. ( )
2. A property by which a bat can locate its prey insects through the sound reflected from them. ( )
3. An animal that can turn its head backwards, and his a bowl-shaped face and large eyes. ( )
4. A system that control all the body function, and nerves are one of its parts. ( )
5. Organs include the eyes, ears , nose , tongue and skin ,and they receive information from the surroundings and send it to the brain. ( )
6. A desert rodent with a small body, large ears and hind legs.( )
7. A system that works inside the body to keep the organism away from danger. ( )

**What happens if …?☺**

1. Bats lose the ability to hear by using echolocation property.

……………………………………………………………………………………………………………

2. Owls can not turn their heads in all directions.

……………………………………………………………………………………………………………

3. Your hand touches the spines of a barbary fig plant.

……………………………………………………………………………………………………………

4. The Egyptian jerboa hears a snake moves towards it.

……………………………………………………………………………………………………………

# …Home Work…

**Choose the correct answer:-(**

1. Animals that become active at night are called …………………..
a. Diurnal animals b. Nocturnal animals c. Endangered animals
2. The brain is the main control center in the body, so it can deal with ………….. at the same time.
a. Two senses only b. Three senses only c. All the five senses
3. Flying bats don't hit different objects at night because they can …………………
a. See them clearly in darkness. c. Touch them
b. Hear the echo reflected from them. d. Smell them
4. Owls have all the following properties to sense distant preys that make low sound, except ………………………………
a. Large eyes c. a head that turns in all directions
b. Weak sense of hearing d. a bowl-shaped face
5. When a jerboa hears the sound of a moving snake, it ……………………………
a. Jumps quickly to run away from the snake. c. jumps to hunt the snake.
b. Makes sounds to frighten the snake. d. remains standing in its place.

**Choose from column (B) what suits it in column (A):-**

| (A) | (B) |
|---|---|
| 1. Sensory receptors<br>2. Nerves<br>3. Brain<br>4. Spinal cord | a. It is the main control center in the body.<br>b. They are electrical impulses that reach the brain.<br>c. They are found on the sensory organs and the first to sense the surrounding environment.<br>d. They receive information from the sensory receptors.<br>e. It is found in the backbone and helps transmit messages between the body and the brain. |

Give reasons for ...?

1. Animals that live in hot regions become active at night.

……………………………………………………………………………………………………………

2. Owls have bowl-shaped face.

……………………………………………………………………………………………………………

3. The presence of hair on the Egyptian jerboa´s feet and toes.

……………………………………………………………………………………………………………

4. The Egyptian jerboa can jump for long distances.

……………………………………………………………………………………………………………

# …Lesson three…

## How the nervous system works

### Functions of the nervous system:

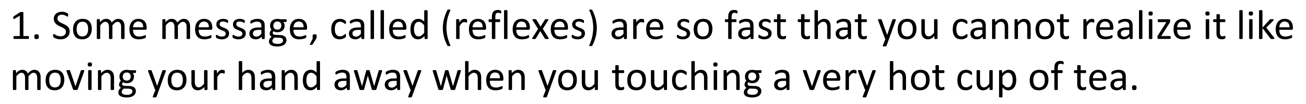
It collect information through the sensory organs ( eye, ear, skin ) about what happen.
It sends this information to brain understanding what this information means.
It tells the body what to do according to these information.

Example

When your ears hear the bird chirping ( sound wave)

Your ears send a massage through the nerves to the brain, which translates these sound waves.

Then, the brain sends a message to the body about what to do, like look for the bird on the tree.



1. Some message, called (reflexes) are so fast that you cannot realize it like moving your hand away when you touching a very hot cup of tea.
2. Other messages are sent from and to the brain automatically, like breathe.

### ***Describing the nervous system***

From the previous activity, we conclude that:
The parts of nervous system work together to:

- Sense the environment by **sensory organs** ( eyes, nose, mouth, skin,…)
- Process the information to decide the best action by **brain.**
- Send message to body parts by **nerves** to react to these information

**Without all of parts of nervous system, the person might not receive, send or react to the information.**

# ….Home Work…

## Choose the correct answer:-

1. Your sensation of hot weather depends on sensory receptors in the……………
a. Eyes b. Nose c. Ears d. Skin
2. Recognizing thunder and lightning depends on the senses of …………………..
a. Hearing and sight b. Sight and smell c. Hearing and touch
3. If you smell smoke from something burning nearby, then you realized you had to move away fast. This means that there is an integration between the …………… in this situation.
a. Digestive system and respiratory system.
b. Nervous system and urinary system.
c. Respiratory system and nervous system.
d. Digestive system and nervous system.
4. You opened the door of you house when you heard the doorbell. Which of the following statements explains the sequence of messages inside your body in this situation ………………………………..
a. Ears → brain → hand c. Brain → hand → ears
b. Ears → hand → brain d. Brain → ears → hand
5. The nervous system gather information from the environment through ………. And then process them by ……………… .
a. Brain – nerves c. spinal cord – brain
b. Nerves – sensory organs d. sensory organs – brain

## Write the scientific term :-

1. It delivers messages between the spinal cord and different body organs. (                )
2. The sensory organ that can distinguish between sharp and rough voices. (                )
3. The organs that receive information from the surrounding environment. (                )
4. They are messages sent by the nervous system that are often so fast that you cannot realize them. (                )

## What happens if …?

1. The spinal cord became absent from the components of the nervous system.
……………………………………………………………………………………………………………
2. Sensory receptors related to the eyes stopped sending messages to the brain.
……………………………………………………………………………………………………………

**Give reason :** Humans can recognize the sounds of different musical instruments.
……………………………………………………………………………………………………………

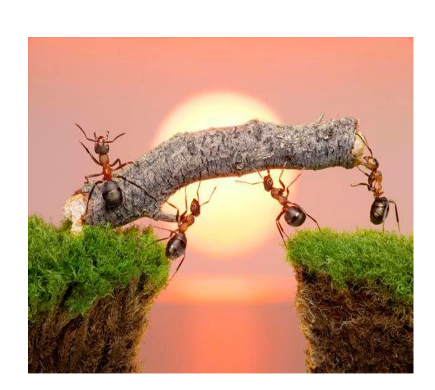
# ...Lesson four...

## How Animals use communication systems?

- Technology systems allow humans to communicate with each other through:
1.Making phone calls.
2.Sending text messages and e-mails.
Animals don't use technology system as we do, but they can communicate by using other systems. ***Example:-***

### *Ants*

- Ants live in **colonies** that contain thousands of individuals.
- Group of ants within a colony have different roles,
Where they have developed systems that help them divide their work among themselves, so there are
**Nurse ants, Scout ants, Soldier ants.**



***How do groups of ants communicate with each other?***

- When the food is low, **nurse ants** send smelly messages to **scout ants** Which are responsible for location food.
- The **scout ants** respond by sending a smelly message to alert the ants Where to find the food.
- The **soldier ants** also use smelly messages to communicate if there is danger.

- Humpback whales sing under water to communicate with each other, where they sing a wide range of notes (tones) and a series of songs.




- The humpback whale's songs have different sounds depending on the season, where:

| *In winter* | *In summer* |
|---|---|
| It is the **mating season.** Their songs have **high-pitched** sounds (sharp voice of woman) that travel better through **cold** water. | It is the **feeding season.** Their songs have **low-pitched** sounds (rough voice of man) that travel better through **warm** water. |

# Technology Inspired by Nature

Bats use sound in some purposes such as:
- Communication with each other.
- Getting information about their surroundings by hearing sense.

***How does the bat use its ears for echolocation to get information about its surrounding in dark?***

1. Bats makes a high-pitched sound.



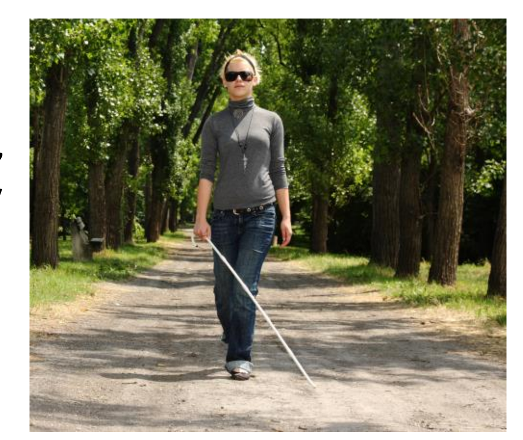
2. The sound hits something nearby the bat and reflects back to it in (echo) form.

3. Bat listens for the echo (reflected sound).

So, bat knows that there is something nearby.

## Bat inspired technology:

- Scientists have been inspired by adaptation of bat echolocation to find ways to help blind people detect their surroundings, where:



- Scientists have created a special cane that emits a high-pitched sound just like bats do.
- As a blind person is walking with this special cane, an echo of this high-pitched sound is picked up by this special cane.
- The echo is turned into vibration that the person can feel with his thumb,
- The vibrations of the special cane tell the blind person the direction of the obstacles and objects around him.

--- Humans cannot hear (high-pitched) sound produced .

| Special cane of blind person | Bat |
|---|---|
| **similarities** | |
| They emit a high-pitched sound that bounces off objects as an echo. They receive the echo that can tell how far away objects are. | |
| **Differences** | |
| It picks up an echo from sound it emits And change it into vibration? | Bats picks up an echo from sound and emit But they Don't change it into vibration. |

## …Class Work…

**Choose the correct answer :-**

1- sending smelly messages when there is a shortage of food is the role of ………
a-queen ants b-nurse ants c-scout ants d-solider ants

2-alarming the colony from dangerous is the role of ………………
A-queen ants b-nurse ants c-scouts ants d-solider ants

3- humpback wheels sing during ………………….months, which is the mating seasons
a-winter b-summer c- spring d-autumn

4- bats use their ………… To get information about their surrounding in the dark.
a- Nose b- tongue c- eyes d- ears

5- Echolocation in some animals is the use of……. Pitched sounds for finding food.
a- Medium b- low c- very low d- high

6- the blind person΄s cane and …………….. emit a high-pitched sound that bounces off objects forming an echo.
a- lizard b- polar bear c- bull shark d- bats

7- songs of humpback whales in winter are characterized by each of the following except……………………..
a- having high-pitched sound c- having soft sounds
b- travelling better through cold water d- having low-pitched sounds

**What happens if ….?**

1. The amount of food in the ants colony decreases.

……………………………………………………………………………………………………………..

2. Bats cannot use echolocation property.

……………………………………………………………………………………………………………..

3. The hearing sense of humpback whales becomes weak.

……………………………………………………………………………………………………………..

4. There is a danger near to an ants colony.

……………………………………………………………………………………………………………..

# ...Home work...

## Put (True) or (False)☺☺

1. A special cane is invented to help a person who has lost the sense of hearing. (  )
2. The sound pitch from a blind person's cane is too high for humans to hear. (  )
3. Bats have the ability to change echo into vibrations just as the canes. (  )
4. Animals communicate with each other by using different senses. (  )
5. Humpback whales produce more than one type of songs. (  )

## Write the scientific term☺

1. A season in which the humpback whale produces high-pitched sound. (  )
2. A group of ants which is responsible for sending smelly messages when there is a shortage of food. (  )
3. Pitched sounds which travel through cold water better than through warm water. (  )
4. Sense organ that can detect sound energy. (  )
5. A simple tool (device) used by blind people to walk safely. (  )

**→Mention two devices that human can use to communicate with their surroundings, where their ideas are inspired from some animal adaptation, then mention the name of these two animals.**

| Devices | Inspired from the adaptation of |
|---|---|
| 1. ...................................................................... | ........................................................... |
| 2. ...................................................................... | ........................................................... |

# Unit (1) Concept (3)
# Light and Sight
## ...Lesson one...

...Hunting with Night Vision...

We can't see in dark, but some animals like fishing cat and tarsier monkey can.

Human eyes need light to see well, without light they need a device called ***(night vision goggles)*** to see in dark.

***Night vision in animals:***

The Fishing cat

It is a **wild cat**, one of **nocturnal animals** that hunt for food at night.
Its eyes seem to glow in dark!! ***G.R***



1. It has ***a mirror-like membrane*** at the back of its eyes.
2. When light enters to its eyes, it bounces (reflect) off This membrane, allowing to collect more light.

This .................... Adaptation, is found in all cats and allow them to have excellent night vision to hunt in low-light places.

The ability of human and nocturnal animals to see in the dark:

**Humans** have small eye and our eye pupil open narrower.
**Nocturnal animals** have big eye and them eye pupil open wider.



!!!!What happens if the fishing cat eyes have no mirror-like membrane.
- It can't see clearly and hunt at night.

Sources of light



A source of light: is something that emits (gives off) its own light.

***Examples of sources of light:***


Sun


Electric lamps


Flashlight

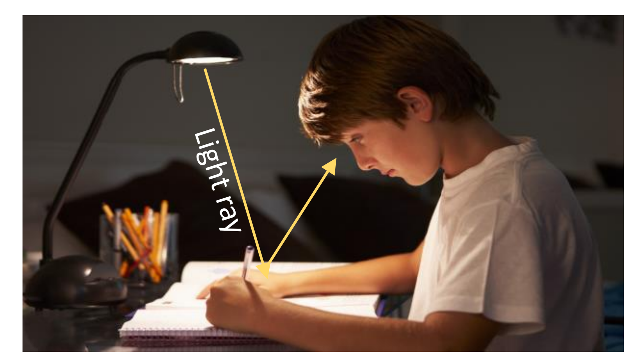

Candles


Fire

## *How we see?*

When the source of light emits light rays that fall on object, the light rays bounce off these objects to our eyes to see them.

Light: it is a visible form of energy that travels in waves form.




➩ In complete darkness, we can't see anything cause without light bouncing off the object into our eyes, everything will look black.

## ...Class Work...

**Choose the correct answer:-**

1. Which of the following organs are working together for seeing different object? ...............................
   a. Nose and brain. c. tongue and brain.
   b. Eyes and brain. d. Ears and brain.

2. The pupils of human eyes open .................. That of nocturnal animals.
   a. Typical to b. wider than c. narrower than d. similar to

3. To detect the place of a table in a completely dark room, you can depend on..
   a. Sight sense b. taste sense c. touch sense d. hearing sense

4. All the following things are considered as light sources, except...............
   a. The sun b. eyes c. the light lamp d. fire

5. The energy which must present to make our eyes able to see the objects around us is ............... Energy.
   a. Sound b. electric c. light d. magnetic

**What happens if**

The mirror-like membrane in the fishing cat's eyes is not present.

..............................................................................................................................

# …Home Work…

**Complete the following sentences:-**

**( mirror-like membrane – bounce off – light – sun – more light – source of light – structural )**

1. Any object that gives off its own light is called a ……………………….. .
2. All cats have a ……………………. At the back of their eyes.
3. Human eyes need ………………… To see clearly in the low-light places.
4. The eyes of fishing cat have a mirror-like membrane bounces off the light, and this is considered as a ………………….. adaptation.
5. We can see objects when the light rays ……………. These objects to our eyes.
6. The energy that helps human and animals see, is the ……………… energy.
7. The ……………… Is one of the light sources in the sky.

**Write the scientific term:-0**

1. A species of wild cats, whose eyes glow at night. (                    )
2. A tool that the human can depend on to see in the dark. (                    )
3. The organ that is affected by light and responsible for sight. (                    )

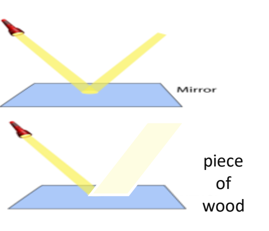
**Put (True) or (False)☺**

1. Both of the moon and the cat's eyes reflect the light that falling on them. (    )
2. Cats have excellent night vision, while humans are not. (    )
3. We can see the mirror that presents in a completely dark room. (    )
4. We can see the moon although it doesn't emit any light. (    )

# ...lesson two...

## ...Light Reflection...

Shiny and smooth materials reflect light better than rough materials.




## What happen to light when it hits different matter?

Light is a form of energy that travels in straight lines in wave (form).

→ when traveling light hits an object:

1. Some of the light energy is absorbed.
2. Some of the light energy reflects (bounces) off the surface.
3. Some of the light energy may go through the object.

Object classified into two groups which are:

| Opaque objects | Transparent object |
|---|---|
| They are objects that don't allow light to pass through.<br><br>They can't be seen through them.<br>Ex: rocks, wood, metals, human body. | They are objects that allow light to pass through.<br><br>Things can be seen through them<br>Ex: air, water, glass windows and lenses. |

### *Why do you see your body shadow?*



- Your body is an opaque object, cause the light that hits your body bounces off or absorbed, but no light passes through your body.

→The reflected light depends on the smoothness of the surface:

| Smooth surface | Rough surface |
|---|---|
| If the surface is smooth like mirror, the light rays will reflect in **one direction** with the same angle at which they hit the object originally. | If the surface is rough like a painted surface, the light rays will **scatter or diffuse in different direction**. |

Incident Rays
light that falls onto an object or surface
Specular Reflection
mirror-like reflection
Smooth Surface
causes a mirror-like reflection as light travels in the same direction and in the same angle

Incident Rays
light that falls onto an object or surface
Diffuse Reflection
scattered reflection
Rough Surface
causes light to reflect in different angles, creating a scattered reflection

## How dose light striking matter make it possible for human and animals to see?

1. When light rays strike an object, light reflects (bounces) off this object.
2. The reflected light travels in a straight line into the eyes.
3. Special nerves in the eyes send messages to the brain.
4. The brain interprets the message as an image of this object.

# ...Home Work....

## Choose the correct answer☺

1. When light rays hit an object, all the following sentences are correct except .....
a. Some of this rays is absorbed by the object.
b. Some of this rays may go through the object.
c. Some of this rays is bounced off the object.
d. All of this rays are absorbed by the object.

2. All of the following are transparent object, except .............
a. Water b. paper c. glass d. air

3. Mirror causes falling light rays to........................
a. Reflect at the same angle they strick the mirror. c. Pass through it.
b. Diffuse like that of rough surfaces. d. Reflect in different directions.

4. A shadow of an object is formed because ........................
a. Light can't pass through the object. c. This object is transparent.
b. Light can pass through the object. d. This object is made of glass.

5. Our eyes, .....................
a. Can see through transparent objects, but not through opaque object.
b. Can see through opaque object, but not through transparent object.
c. Can't see through both opaque and transparent objects.
d. Can see through both opaque and transparent objects.

## Look at the following figures, then answer the questions below:"(

Figure (a)

Figure (b)

## Complete ☺

a. The surface in figure (a) is ..................................................................................... .
- Because ..............................................................................................
b. The surface in figure (b) is ..................................................................................... .
- Because ..............................................................................................
c. In the previous two figures, the falling and reflected rays show that light travels in ................. Lines.

## Choose from column (B) what suits it in column (A) :-

| (A) | (B) |
|---|---|
| 1. Mirror | a. It is a transparent piece that allows light to pass through. |
| 2. Piece of cloth | b. It is a rough surface that scatters reflected light rays. |
| 3. Reflected light | c. It is a smooth and shiny surface that reflects most of falling light |
| 4. Lenses | d. It is considered as a source of light. |
| | e. It is the light that bounces off a reflecting surface. |

# ...lesson three...

## ...Firefly light show...

Fireflies beetles are type of insects that can produce a chemical reaction inside their bodies that allow them to light up and communicate with other fireflies.

How do fireflies beetles produce lights they use to communicate?



1. Fireflies use their swings to form different flash patterns to:
- Warn off other firefly beetles form predators.
- Attract a mate to reproduce.

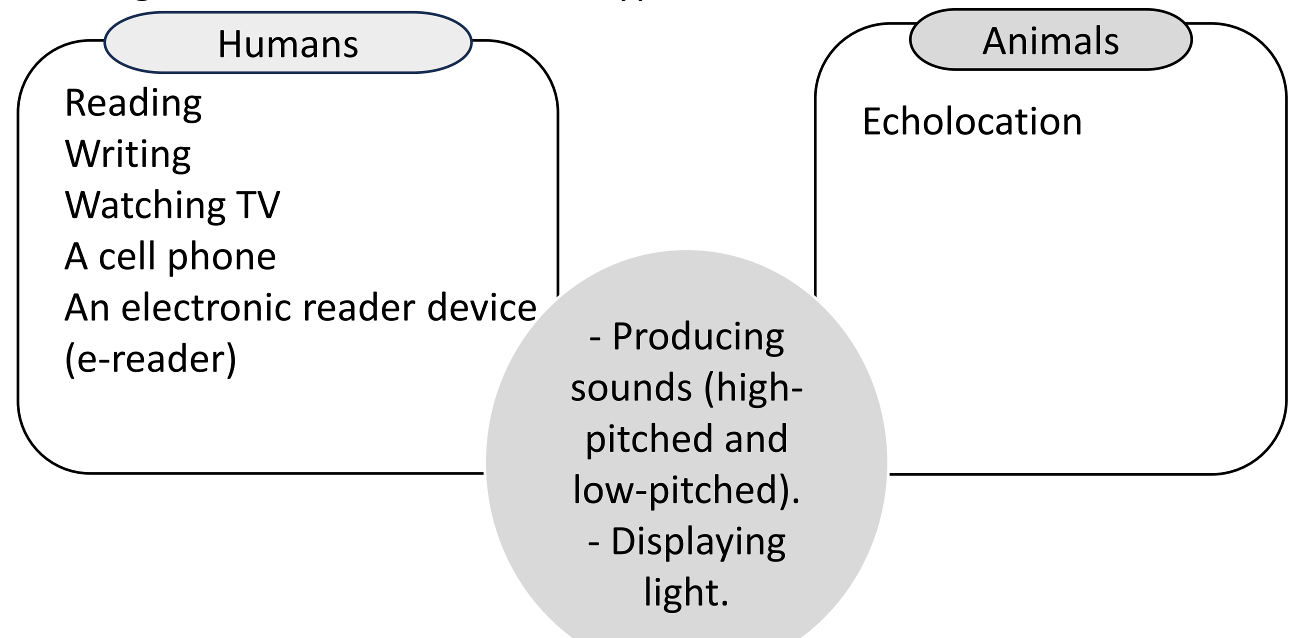
2. They flash at regular periods of time, but if there is another group of fireflies flashing nearby, they will change their own flash pattern to match the flash pattern of the other group to communicate.

Humans use lights to communicate with each other to transfer information using traffic light.

What do you already know about communication and information transfer?

There are some similarities and differences between types of communication and transferring information in humans and animals.

→ Theis figure shows some different types of communication in human or animals:




**What happens if** A firefly wants to attract a mate to reproduce.

……………………………………………………………………………………………………

# …Home Work…

## Choose the correct answer:-

1. Reading and writing are common types of communication in ……… world.
   a. Animals b. plants c. humans d. birds

2. changing the pattern of lighting up in a firefly is an example of………………
   a. Structural and behavioral adaptation. c. Only behavioral adaptation.
   b. Physical and behavioral adaptation. d. Only structural adaptation.

3. A firefly isn't a bird, but it is a type of…………………… .
   a. Lizards b. Reptiles c. amphibians d. beetles

4. The chemical reaction inside firefly beetles allow them to …………………..
   a. Reflect the sunlight c. produce their own light
   b. Reflect the moon light d. produce their own sound

## Choose from column (B) what suits it in column (A) ;)

| (A) | (B) |
|---|---|
| 1. Watching TV<br>2. Echolocation<br>3. Displaying light | a. Is a type of communication in both animals and humans.<br>b. Is a type of communication in humans only.<br>c. Is a type of communication in animals only.<br>d. Is a type of communication in plants only. |

1. ……………  2. ………………  3. …………………

## Give reasons for :-}

1. Fireflies use different patterns of flash light to communicate with each other.

………………………………………………………………………………………………………

2. Humans receive and send information through speaking, writing, reading.

………………………………………………………………………………………………………

3. Fireflies produce a chemical reaction inside their bodies.

………………………………………………………………………………………………………

# ...lesson four...

## ...Transferring Information...

- Sense organs collect information about the world around us then send signals to the brain through nerves for processing and understanding.
- Human senses are used to gather information from the environment and communicate with others, where:

1) Eyes detect light energy.
2) Ears detect sound energy.

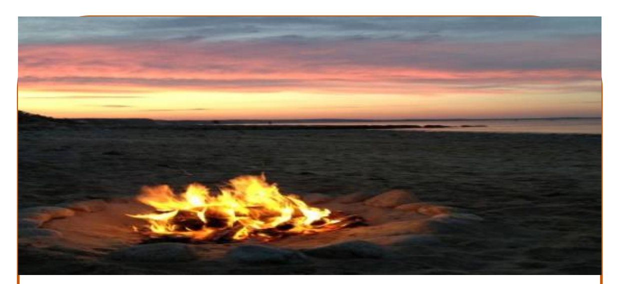
→ Examples of information that the eyes receive:



Seeing the red traffic light means you must stop.




People use a rescue flare to get help.



People use signal fires to communicate over distances of many kilometers.



Many hikers (travelers) use mirrors to attract the attention of rescue helicopters.

### Codes and transferring information:-

- Human use codes to transmit information.

Code: it is a pattern that has meaning.

Thumbs-up or thumbs-down:
can use to express simple meanings like good or bad.
Traffic lights: can use to express like stop or go.



Expressions on faces can help people predict our feelings
(happy, sad, angry,…..)



Language: code of sound,
different language are different codes
that are used to transfer information.



Writing: is code form of symbols in a pattern
To give a specific meaning by the arrangement
Of letters in a word.



Music or Sounds: different sound tones produced
From human or musical instruments can be used
In communication



Lighthouses send codes in flashes light form
That tell sailors where they are.



***When sense organs receive this information and send messages to the brain,***
***The brain decodes and interprets the meaning.***

# …Home Work…

## Choose the correct answer;)

1. Sense organs collect information and send signals to …………. For processing and understanding.

a. hands b. legs c. stomach d. brain

2. All of the following are forms of codes, except …………….

a. Thumb up and down hands. c. Writing
b. Swimming d. Face expressions

3. People use a rescue flare to communicate with each other depending on the sense of ………………..

a. Sight b. touch c. hearing d. smell

4. All the following signals are information that the eyes receive, except ………

a. Fire alarm b. green traffic light c. rescue flare d. signal fires

## Give reasons for ;(

1. The symbols that are used in writing have a specific pattern.

……………………………………………………………………………………………………………

2. People use face expressions during talking with each other.

…………………………………………………………………………………………………………….

## What happens if <...>

- the traffic light becomes red while you are going to cross the road.

……………………………………………………………………………………………………………

## Put (True) or (False) ;0

1. Different languages have similar codes. ( )
2. Animals communicate with each other by using different senses. ( )
3. Traffic lights send code in the form of flashes of light that tell sailors where they are. ( )

# Unit (2) Concept(1)
## Starting and Stopping
## …lesson one…
### ..Truck Versus Airplane..



An airplane can move faster than a truck. ( )

**Truck versus jet airplane:**

The engines on an airplane are much more powerful than the engine in a truck, So airplane fly much faster than moving trucks.

**The shockwave truck:**

This truck called the shockwave that contain three jet engines.

**How does the shockwave move?**

The three jet engines make the shockwave truck reach speeds more than 500 km per hour.
The shockwave is about five times faster than the normal trucks.



**How does the shockwave stop?**

To stop the shockwave, engineers install three parachutes in it, that the driver opens them to help slow down the shockwave quickly.
This idea is used in rocket designs.



## Making things move

All objects around us cannot move without push and pull forces, where:



- A ball lying on the ground doesn't move until someone pushes it with his foot to roll the ball.
- A closed drawer doesn't open until someone pulls the handle with his hand to open the drawer.

***Air force:***



Air can provide enough force to move some objects like:
The wind blowing that can move the leaves of tree.

Some engineers fix fire extinguishers onto a cart.
When they release air from the fire extinguishers,
The air moves backward that makes the cart begins to move forward.
By increasing the number of fire extinguishers,
The speed of the cart increase and the distance that it moves increases too and vice versa.

# …Home Work…

## Choose the correct answer;}

1. When you move something toward you, this represents ………………… .

a. Light energy b. pushing force c. sound energy d. pulling energy

2. Push or pull actions are considered as types of ……………. .

a. Device b. adaptation c. force d. energy

3. The speed of a normal truck is more than that of ……………… .

a. A jet airplane only
b. A bicycle only
c. a jet airplane and a rocket.
d. a rocket and a bicycle.

4. All the following motions occur by the effect of pulling force, except ……… .

a. Wearing your socks.
b. Lifting up a bag from the ground.
c. opening a closed drawer.
d. kicking a ball.

## Put (True) or (False)

1. You need energy to push a car forward or backward. ( )
2. When the air is released backward from the fire extinguishers fixed to a cart, the cart moves backward. ( )
3. Using a remote control of a television needs a pushing force to act on its buttons. ( )
4. To open or close a door, we have to push or pull it. ( )
5. Air has a force that can move some objects. ( )

## What happens if ….?

1. Engineer placed jet engine inside a normal truck instead of its normal engine

……………………………………………………………………………………………………………………

2. The shockwave driver opens the parachutes.

……………………………………………………………………………………………………………………

## Write the scientific term of each of the following;)

1. A force that you make to move an object toward you. ( )
2. A force that you make to move an object away from you. ( )

## Complete ;(

1. The car can move or stop depending on the change of ……………. Acting on it .
2. If we put more than one fire extinguisher to a cart, so the ………………. Of this cart will increase.
3. When you kick a ball, it moves due to the effect of ………………………… .
4. One of the fastest and most powerful trucks in the world is ……………………. .

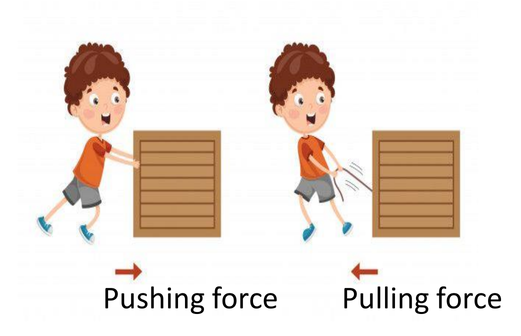
## …lesson two…

### What do you already know about starting and stopping?

How do objects move?

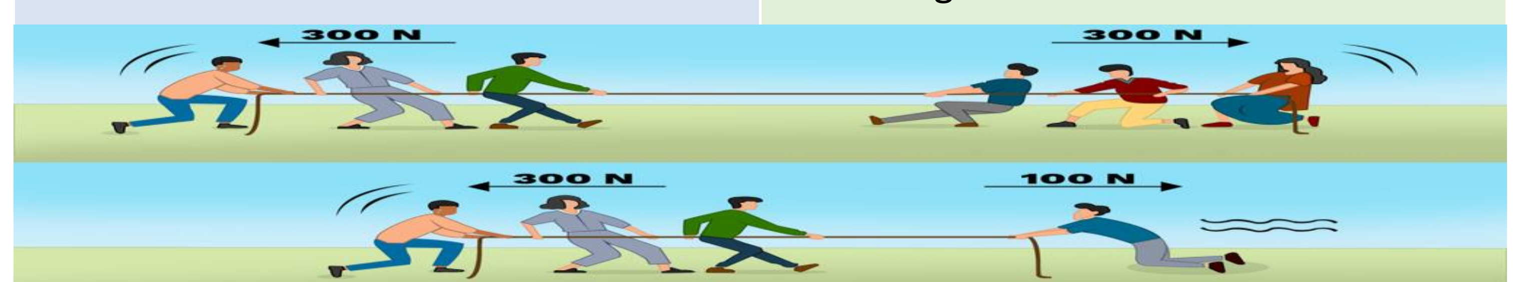
They are two forces that cause objects to move which are:

1. ***Pushing force*** like a child pushes a box.
2. ***Pulling force*** like a child pulls a box.




The relation between motion with balanced and unbalanced force:-

| Balanced forces | Unbalanced forces |
|---|---|
| If there are balanced forces, object will not move. In the tug-of-war game, if the two team are pulling the rope with equal force. This means that, this force is balanced. So, the rope will not move. | If there are unbalanced forces, Object will move. In the tug-of-war game, if one team is pulling the rope with a greater force. This mean that, this force is unbalanced. So, the rope will move toward the team with the greater force. |




## …Class Work…

**Complete the sentence by using ( pushing – pulling )**

1. Mohamed uses the ……………. Force to move his suitcase.
2. Yara uses the ……………. Force to move her skating board.
3. Ehab uses the …………… force to hit the ball.
4. Children use the …………. Force in tug-of-war game.
5. Ahmed uses the ……………. Force to lift up weights.

# *Objects in motion*

## How do we know an object is moving?

An object is in motion if its position changes from one place to another, Even if this change can't be seen and it is compared to something else that is not moving in usual (fixed point).

***Motion***: it is any change in the position of an object relative to a fixed point.

Example of an object motion:-

1. The girl holding a ball in starting position.
2. When she throws the ball , it will move by **the pushing force** through the air.
3. Then the ball will drop into boy's hand by **pulling force** of gravity.
4. The ball will stop by **the pushing force** of boy's hand against the ball movement.
5. The position of the ball changes, relative to a fixed starting point.

***Gravity:*** it is the force that pulls objects down toward the earth.

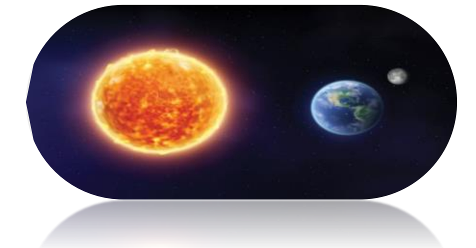
Some motion are easy to see, such as :
A person walking down the street.





Leaves move by the wind blowing

The rotation of the earth around the sun.



## …Class Work…

**Write the scientific term;]**

1. A change in the position of an object relative to a fixed starting point. (                    )
2. It is the force that pulls objects down toward the earth. (                    )
3. The force you can do to bring an object closer to you (                    )
4. The force you can do to move an object away from you. (                    )

# Force

## What makes objects move?

- Any object needs a force to move and change its position.

**Force:**
it is a push or pull that is applied to an object causes it to change its position.

## →What are the forces that affect the box when you lift it?

- The force of the gravity pulls your box downward.
- The force of your arm pulls your box upward.
- The pulling force of your arm is greater than the pulling force of the gravity (two unbalanced force).
- So, the box moves up toward the greater force.

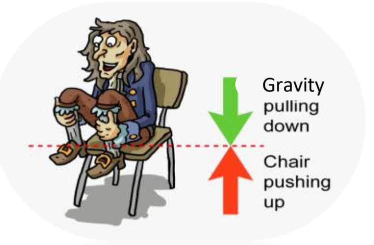



→To move any object from the ground, the pulling force of your arm must be greater than the pulling force of the gravity.

## →Is there any force affects objects when they are not in motion?

When you sit a chair:

- The force of the gravity pulls you downward.
- The chair exert force that pushes your body upward.
- The pulling force of the gravity is equal to the pushing force of the chair (two balanced force).
- So, there is no motion due to the two balanced force that hold you in the chair.




## →When a book is put on table?

- The force of the gravity pulls the book downward.
- The table exerts force that pushes the book upward.
- The pulling force of the gravity is equal to the pushing force of the table (two balanced force).

(......................)
Force of table on book
Force of gravity on book
(......................)

- So, there is no motion due to the balanced forces that affect the book.

# ...Home Work...

## Choose the correct answer:-

1. When an object is in motion, this means that its ............ Changes.
a. Shape b. color c. position d. size

2. When you sit on a chair, the force of gravity is ............. And holding you in the chair.
a. Pulling you downward c. pushing you downward
b. Pulling you upward d. pushing you upward

3. Which of the following will cause an object to move...?
a. Sound energy b. gravity force c. light energy d. friction force

4. You can see the movement of the following objects, except the movement of ......................... .
a. A running horse b. A flying airplane c. see waves d. the planet earth

5. Gravity is a force that ..................
a. Pushes objects down toward the earth c. pushes objects toward the sky
b. Pulls objects down toward the earth d. pulls objects toward the sky

## Put (True) or (False) ;{

1. The stopping object can't move until a force acts on it. ( )
2. Unbalanced forces cause a change in the object position. ( )
3. The rotation of the earth around the sun is easy to be seen. ( )
4. When you jump up, the force of friction pulls you back to the ground. ( )

## What happens if ...?

- The pulling forces of the two teams are equal in the tug-of-war game.

.......................................................................................................................... .

- You let your toy out of your hand.

.......................................................................................................................... .

# ...lesson three...

→How does an object in motion stop?

A moving object only stops when a force of the same amount is applied to it in the opposite direction of its motion.

- **The force that stops a moving object may be:**

| Easy to be observed | Hard to be observed |
|---|---|
| - When a car crashes into a wall, it will stop.<br>- Because the wall applied a force to the car with the same amount of the force that pushes the car toward the wall. | - When a car runs out of fuel on flat road, its speed decreases gradually until it stops.<br>- Because there is a friction force comes from:<br>1. Friction (rub) between the car and road.<br>2. Friction between the air flows over the car against its surface.<br>Motion<br>Friction |

***Friction***: it is a force that is exerted when objects rub against each other.

Notes

1. Friction force always slows down or stops motion of moving objects.
2. Direction of friction force is always opposite to the direction of motion.

- Hard push causes object to travel a long distance.
- Gentle push causes object to travel a short distance.

## ...Class Work...

**Choose the correct answer;{**

1. The force that occurs when an object rubs against another object is called .........
   a. Gravity b. friction c. pull d. push
2. There is ............. Force between the car tires and the road that acts to decrease car's speed gradually.
   a. Friction b. pull c. push d. Gravity

# …Home work…

## Put (True) or (False) ;}

1. When a car crashes into a wall, it will not stop. ( )
2. When a car runs out of fuel on a flat road, its speed increases gradually until it stop. ( )
3. The motion of an object on the ground is affected by a friction force. ( )
4. If the same force acts on two different object so, the bigger object will travel for a longer distance. ( )
5. Friction force always slows down or stops the motion of moving objects. ( )

## Write the scientific term ;)

1. It is a force that slows down the motion of moving objects. ( )
2. It is a force that exerted when objects rub against each other. ( )

## Give reasons for ;{

1. When you stop pedalling during the movement of your bicycle, it slows down until it stop.

……………………………………………………………………………………………………………………

2. If you push two similar toy cars on the same ground, one of them may travel for a longer distance than the other.

……………………………………………………………………………………………………………………

3. When your car crashes into a wall, it will stop moving.

……………………………………………………………………………………………………………………

# ...lesson four...

## ...Energy, Work and Force...

### The relationship between energy, work and force:

*Example :*

- The man exerts a pushing force on the car to move it.
- So, this force transfers energy from his body to the car.
- When he moves the car, this means that he is doing work.



### From the previous example, we can conclude that:

Force transfers energy from one object to another.

The work done is equal to the amount of energy transferred by force to move object.

**Force** → Transfers → **Energy** → Used to do → **Work**

Force and energy are different, but they are related to one another, where the force is the effect that changes energy and allow it to do work.

## ...Class Work...

### Complete the following sentences ;}

1. Any force applied to an object is considered as the effect that changes ……………. And allows it to do ……………… Done by this object.
2. The work done on a basketball is equal to the amount of ………….. transferred from the player hand to the ball.
3. When you push a table to move on the floor, your pushing force transfers ………………… from your body to the table.
4. To stop the rolling ball on the ground, you need to exert a ……………… equal to that exerted by the ball in the opposite direction.

# …Home Work…

## Choose the correct answer;)

1. To stop a moving object we can apply a ……………… against it.
a. Pushing force b. sound energy c. gravity force d. light energy

2. The work done is equal to the amount of ………… Transferred by a force that is used to move an object.
a. Friction b. pushing c. energy d. gravity

3. All of the following examples can move by a pushing force, except …………….
a. A swing b. a ball c. tug-of-war rope d. a car

4. Logy pushed his toy car that moved forward, to stop it he should ………… .
a. Push it in the same moving direction.
b. Pull it with a small force in the same moving direction.
c. Pull it with a large force in the same moving direction.
d. Push it in a direction opposite to its moving direction.

## Put (True) or (False) ;{

1. If you try to open a door but you can't open it, this means that work is done. ( )
2. Hitting a tennis ball needs a pulling force. ( )
3. Lifting a book upward needs more energy than pushing a truck. ( )
4. If a person moves a table through a distance, there is a work done. ( )

# Energy and Motion

## ...lesson one...

### ...Roller Coasters...

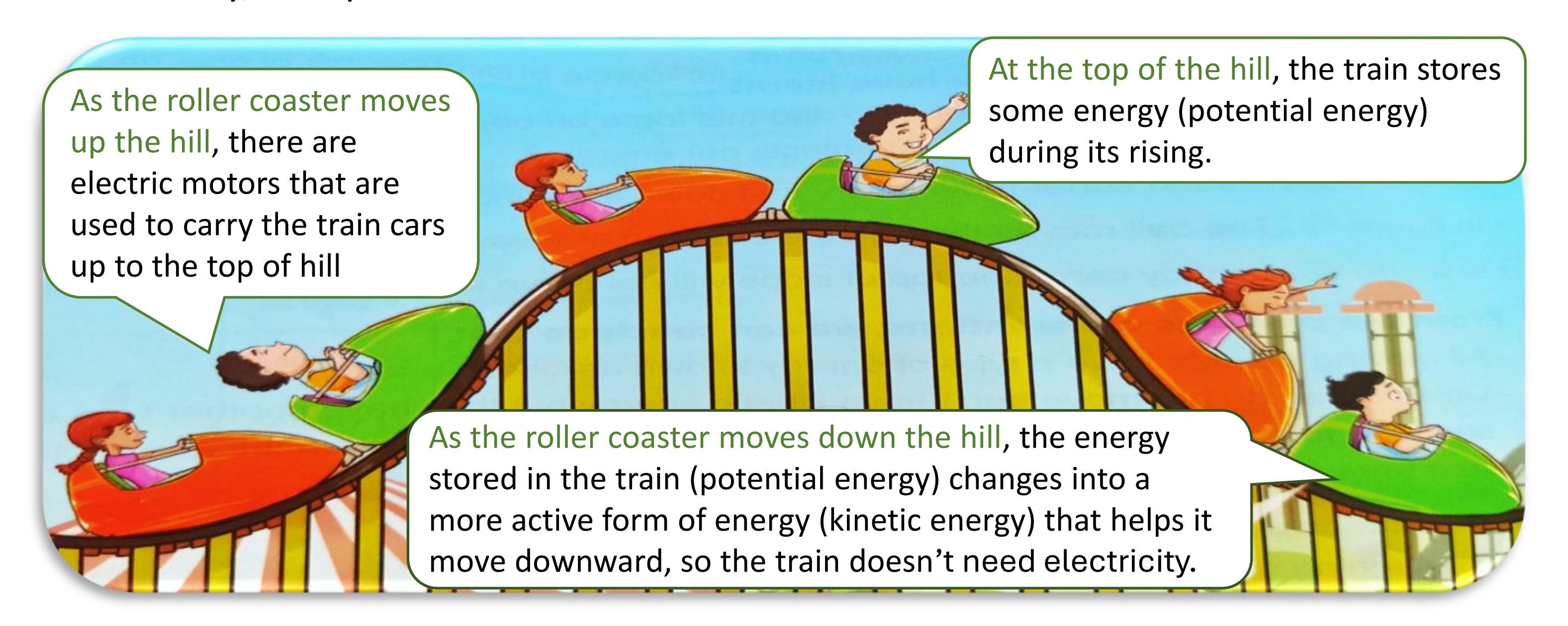
We have different types of energy such as :

1. Kinetic energy.
2. Sound energy.
3. Light energy.
4. Thermal energy.

In your opinion which type make the movement of Roller coaster?

The motion of roller coaster:-

1. Roller coaster moves up the hill slowly and its speed decreases gradually until it reaches the highest point.
2. Then the roller coaster pauses for short time at the top of the hill.
3. Finally, the speed of the roller coaster increases as it moves down the hill.




→**From the pervious explanation, we can conclude that:**

- When the roller coaster moves downward, its kinetic energy increases.
- The kinetic energy increases as the speed increases.

**What happens if...?**

- A roller coaster moves from up to down. (energy)

The stored potential energy in the train is changed into kinetic energy.

- A roller coaster stops. (kinetic energy)

Its kinetic energy becomes zero.

# What do you Already know about Energy and Motion

Energy is part of everything that happens in the world and everything we do.

## Examples show the importance of energy in our life:

1. We eat food to obtain energy to help us grow and move.
2. Energy affects object and makes them move and change their places.
3. Energy helps in operating all electric devices.
4. Energy helps in cooking.
5. Energy helps in lighting houses and streets.

## Moving energy:

***Energy transfers from an object to another like A player kicks a ball:***

1. The kinetic energy transfers from the player's foot to the ball, when he kicks it.
2. Then, the ball moves in the air as a result of the transfer of kinetic energy to it.
3. Finally, the kinetic energy transfers from the ball to the goal net which vibrates as a result of the transfer of kinetic energy to it



Any stopped object on the Earth's surface has no energy, while any object at height from the Earth's surface has special type of energy known as **(potential energy)**

## ...Class Work...

**Put (True) or (False) ;)**

1. Energy doesn't transfer from an object to another. (    )
2. If a wheelchair moves horizontally on the ground, its energy of motion equals zero. (    )
3. We eat food to obtain energy. (    )
4. The moving objects only have energy, while the objects that don't move have no energy. (    )
5. When a stopped object is affected by two opposite equal force, it will not move. (    )

# …Home Work…

## Choose the correct answer ;]

1. When an object moves down a ramp, its stored potential energy………….. .
   a. Changes to a more active form of energy c. increases
   b. Changes to a less active form of energy d. doesn't change

2. Electric motor in the roller coaster helps it to ………………… .
   a. Move up to the top of the hill. b. Move down to the bottom of the hill.
   b. Stop at the top of the hill. d. Stop at the bottom of the hill.

3. The roller coaster has the most energy of motion, ………………… .
   a. As it goes down the hill. c. when it stops at the bottom of the hill.
   b. As it goes up to the top of the hill. d. when it stop at the top of the hill.

4. When the roller coaster goes up, its speed …………………… .
   a. Increases as it reaches the top of the hill.
   b. Decreases as it reaches the top of the hill
   c. Is more than its speed when it goes down.
   d. Decreases as it goes down.

5. The type of energy that allows objects to move is known as …………………… .
   a. Light energy b. solar energy c. potential energy d. kinetic energy

## Write the scientific term ;)

1. The form of energy that the object has due to its movement. (    )

2. The form of energy that increases when the speed of an object increases. (  )

## Give reasons for…?

1. The speed of the roller coaster increases as it moves down the hill.

……………………………………………………………………………………………………….

2. The goal net vibrates when a ball hits it.

……………………………………………………………………………………………………….

# …lesson two…

## …Energy Basics…

- We learned that the force is the effect that changes energy to make it able to do work. So, we can define energy and work as:

***Energy:*** it is the ability to do work or cause change.

***Work:*** it is a force that causes an object to move.

Example: ( Relation between energy and work)



- When a football player kicks a ball, the force of his kick causes the ball move in different direction.
- Thus the player does work and he consumes energy ( that he had obtained from food) to move his leg.
- So, the work done by the player causes the ball to move.

***Facts about energy:***

- ***Energy can be stored and changed from one form to another:***



When you hold a ball, it stores potential energy, when you let it fall down to the ground, the ball is moving where the potential energy stored in it is changed into kinetic energy.

***- We can't see most forms of energy but, we can see and measure what energy can do:***

- We can't see sound energy, thermal energy, electrical energy and chemical energy.
- We can see and measure what energy can do.
- When you push a wooden box and this box moves, this means that the energy transfers from you to the box and also can be measured through the distance that the box moves.



# ...kinetic and Potential...

We have two types of energy which are:

## Potential energy

It is the amount of energy that is stored in an object due to its position.

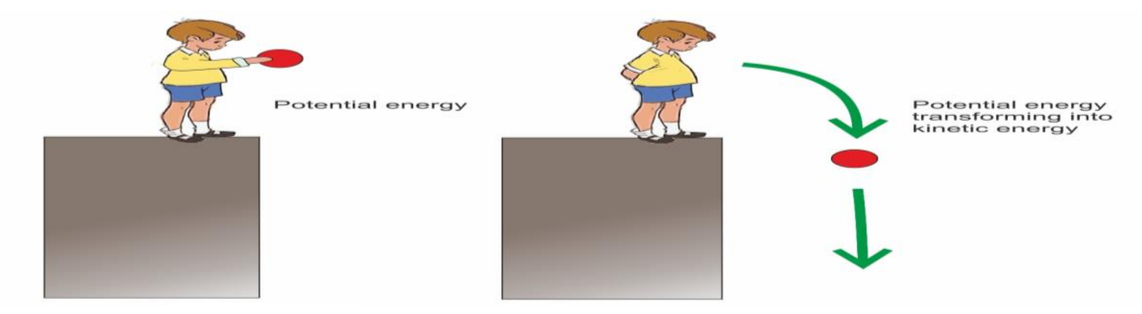
The ball has potential energy stored in it when you lift it up away from the earth's surface.

## Kinetic energy

It is the energy of an object due to its motion.

The ball has a kinetic energy when you let it fall down to the ground.

***Now, let's see how potential energy can transfer to kinetic energy:***




1. The ball that the boy hold it has potential energy.
2. When he throw it down the potential energy is converted into kinetic energy.
3. During the movement of the ball up in the air, its kinetic energy is converted into potential energy Gradually until the boy catch it again.
4. When the boy catch it again its energy will be completely potential

When an object has potential energy, so this object is ready to do work or to be active.

Example2 :-

- A child at the top of a playground slide has potential energy.
- When he moves down along the slide, **the potential energy changes into kinetic energy.**



Example3 :-

- The egg has potential energy when it is in the boy's hand.
- The egg has kinetic energy as it falls down.



## …Class Work…

Choose the correct answer;}

1. The form of energy that is stored in a book placed on a table is known as ……………… energy.
   a. Thermal b. sound c. potential b. light

2. The energy that is stored in an object due to its position, is known as ……………… energy.
   a. Electric b. potential c. kinetic d. chemical

3. When a ball on a certain height is left to fall down,……………… .
   a. Its kinetic energy remains as it is.
   b. Its potential energy remains as it is.
   c. Its kinetic energy changes into potential energy.
   d. The potential energy changes into kinetic energy.

4. A stopped object placed at 10 meters high from the earth's surface has ……………… than the same object when it is placed at the ground.
   a. Larger potential energy c. smaller potential energy
   b. Larger kinetic energy d. smaller kinetic energy

5. The energy of an object due to its motion is known as ……………… Energy.
   a. Kinetic b. sound c. thermal d. potential

6. The form of energy that can be seen is ………………… Energy.
   a. Thermal b. light c. electrical d. sound

**Give reasons for ..?**

1. A bird stops on a tree has energy.

………………………………………………………………………………………………………

2. When a stone is thrown upwards, its potential energy increases.

………………………………………………………………………………………………………

# ...Home Work...

## Write the scientific term ;)

1. The energy that is stored in an object due to its position at a certain height form the Earth's surface. ( )

2. The energy that the object gains due to its motion. ( )

3. The force that makes an object to move over a distance. ( )

4. The ability to do work or cause changes. ( )

5. The energy that is changed into kinetic energy when an object falls down to the Earth's surface. ( )

## Put (True) or (False) ;)

1. We can see all the forms of energy. ( )

2. Any moving object has a form of energy known as kinetic energy. ( )

3. To do work, you must push or pull an object for a certain distance. ( )

4. We can measure the distance that an object moved as a result of pushing force. ( )

5. If an object has energy so, it has the ability to do work. ( )

## What happens if...?

1. An apple falls from a tree to the ground.

( according to the change in its energy)

..........................................................................................................................

2. You transfer a book from the ground to a higher shelf.

( according to its potential energy)

..........................................................................................................................

# ...lesson three...

## ...forms of potential and kinetic energy...

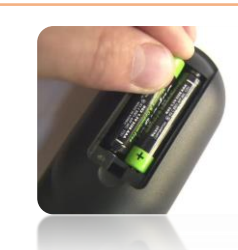
We learned that we have two types of energy (potential energy and kinetic energy) let's know forms about it.

## Forms of potential energy:-

### Gravitational Potential Energy

The Earth attracts objects to its surface by a force called Gravitational force (Gravity).
When an object is raised up against the Earth's gravity, this object stores gravitational potential energy.
Example:
The roller coaster at the top of hill stores gravitational potential energy.

### Chemical potential Energy



Example:
The batteries store chemical potential energy.
The chemical potential energy stored in the battery is not used,
Until this battery is connected to a device.

When a spring is compressed, it stores potential energy inside it.

***Factors affecting potential energy of an object:- (Mass , Height)***

### *Mass*



By increasing the mass, the potential energy increases.
Example:
Ball has mass of 500 has a Greater potential energy than ball that has mass of 50 gram.

### *Height*

By increasing the height from the Earth's surface, the potential energy increases.
Example:
Ball at height 3 meter has a greater potential energy than ball at height 1 meter.

## Forms of kinetic Energy



- Sound energy: Movement of sound waves in the air.
- Light energy: movement of light waves in the air.



- Electrical energy: movement of electricity through wires.
- Thermal energy: vibration of particles in a substance during heating.



## Some changes of potential energy into kinetic energy:-

| Example | Energy changes from | Energy changes into |
|---|---|---|
| | Chemical energy Stored in batteries | Light energy and Thermal energy (heat) |
| | Chemical energy Stored in natural gas | Thermal energy |
| | Potential energy Stored in the spring wire | Kinetic energy, sound energy, thermal energy |
| | Chemical energy Stored in gasoline | Kinetic energy |

***So, Energy can be stored in many different forms.***

***New energy can't be created and also existing energy can't be destroyed.***

- The food you eat also stores chemical energy.
- When you eat food, your digestive system breaks down the food and Changes it into energy stored in your body.

Types of Energy

***Transferred***

**- Energy is transferred from one place to another.**

- Ex: when you kick a ball, kinetic energy of you leg transferred to the ball.

***Transformed (changed)***

**- Energy is continuously changing and transforming from one form to another form.**

- Ex: when the roller coaster goes down the hill, Its potential energy is transformed into kinetic energy.

## …lesson four…

…Easy life tool…

How we can use this knowledge to design a tool that helps us to do work.

***The tool:*** A robot hand.
***Its function:*** Opening the jar cap that it is hard to be opened.
***The source of energy:*** The robot gets power from battery when it's turned on.

The chemical energy stored in the batteries. → Changes into → Electrical energy in the robot hand. → Changes into → Mechanical (kinetic) energy when the robot hand moves to open the jar.

-Energy is not created or destroyed when transferred from the battery to the robot hand.
-Energy is converted from one form (chemical energy) to another form of energy (mechanical energy) when the robot hand opens the jar.

**Choose the correct answer :-**

1. All the following examples store chemical energy, except………….. .

a. Food b. natural gas c. a battery d. a compressed spring

2. A ball at the top of a hill stores ……………… Energy.

a. Potential b. light c. sound d. chemical

3. When you jump high, the force affecting you must be…………………. .

Created b. balanced c. destroyed d. unbalanced

4. If an object stops at a certain height from the Earth's surface for two hours then falls down, this means that …………….. .

a. its potential energy will be destroyed before two hours.
b. its kinetic energy will be destroyed after two hours.
c. its stored potential energy will change into kinetic energy.
d. its stored kinetic energy will change into potential energy.

5. All the following examples have stored potential energy, except……………. .

a. A stopped roller coaster at the top of a hill.
b. A moving car on a flat road.
c. A battery of a car.
d. A compressed spring of a toy.

6. All the following examples represent kinetic energy, except………. .

a. light waves moving through the air.
b. Stored chemical energy in a car battery.
c. Water particles movement during heating.
d. Sound waves moving through the air.

**Choose from column (B) what suits it in column (A) ;-}**

| (A) | (B) |
|---|---|
| 1. Sound energy | a. Changes into another form of energy that can be stored inside the human body. |
| 2. Light energy | b. Changes into electrical energy in a flashlight. |
| 3. Thermal energy | c. When it reaches the nose, it causes smelling. |
| 4. Stored chemical energy in food | d. Is produced from electric heater. |
| 5. Stored chemical energy in a battery | e. When it reaches our eyes, it causes vision. |
| | f. When it reaches our ears, it causes hearing. |

# …Home Work…

## Choose the correct answer ;}

1. When you jump high, the force affecting you must be…………………. .
   a. Created b. balanced c. destroyed d. unbalanced
2. When an object begins to move down a hill, the potential energy stored in it changes into …………………………… .
   a. More active energy c. electrical energy
   b. Less active energy d. light energy
3. Humans can't live without ……………. To obtain the needed energy for doing their activities.
   a. Reading books c. eating food
   b. Watching television d. driving cars
4. The potential energy of an object depends on …………………. .
   a. its height from the Earth's surface only. c. its temperature.
   b. its mass and its height from the Earth's surface. d. its mass only.

## What happens if …?

1. You put a battery inside a flashlight, then you switch it on.

…………………………………………………………………………………………………………………

2. Food burns inside the human body.

…………………………………………………………………………………………………………………

## Write each of the following words in front of the suitable sentence below :0

**( Flashlight – Gas oven )**

1. It changes chemical energy into thermal energy to be used in cooking. (……….)
2. It changes chemical energy into light and thermal energies. (……………….)

## Put (True) or (False) ;-}

1. As the height of an object from the Earth's surface increases, its potential energy increases. ( )
2. We can see the movement of electricity. ( )
3. A compressed spring stores potential energy. ( )
4. Kinetic energy cannot be transformed into potential energy. ( )
5. New energy cannot be created, but existing energy can be destroyed. ( )
6. A fan turns the chemical energy stored in natural gas into thermal energy. ( )
7. The energy which stored in a ball at the top of a hill is chemical potential energy. ( )

# Unit (2) Concept (3)
# Energy and Collision
## …lesson one…
### …collision…

Can you Explain ??

**The trunk (heavier object) has:**
- More mass
- More speed
- More energy



**The small car (lighter object) has:**
- Less mass
- Less speed
- Less energy

What happens to objects when they collide with each other?
- ***In this case,*** if the trunk is the faster object it has more energy than the car which is the slower object.
- ***Therefore,*** during collision, the object that has more energy (the trunk) causes more damage than that has less energy (the car).

**Example of collision:-**

***A Wrecking ball***

It is a very heavy steel ball that swings on a cable.
It is used to collide with walls of a building to help
Construction workers knock down walls or parts of building.



**Collision in cricket:-**

- A cricket is a popular game all over the world.
- In cricket, player uses a wooden bat to hit a ball.
- The cricket player holds a bat and moves it as the ball comes towards him at high speed to Collide with the bat.



**What happens to the energy of the moving bat when it hits the moving ball?**
- The bat transfers its kinetic energy to the ball.
- Then, the speed of the ball increases and the ball returns back in a different direction.
- This collision produces a popping sound and the player would feel the bat hitting the ball.

## ...Watching objects collide...

### What happens to the driver's body when the car stops suddenly?

- The driver's body continues to move forward where the objects that are in motion stay in motion until something stops them.
- ***But,*** what are the safety equipment that keep the driver and passengers in their place?

### *Safety equipment used during collision of cars:-*

**1) Seatbelts:**

They are used in cars to keep the driver and the passengers from moving forward when the car stop suddenly,
so seatbelts have saved thousands of lives.



**2) Airbags**

***Their structure:***

Airbags are made up of thin nylon material folded into the steering wheel, seats, dashboard or doors.

***Idea of operation:***

| During collision | After collision |
|---|---|
| - Airbags inflate automatically when sensors in the car detect a crash.<br>- A sensor tells the airbags to inflate and fill with a gas to provide a soft cushion. | - Airbags deflate almost as fast as they inflate, because they have holes (vents) to allow them to deflate, so the driver can get out of the car. |

***Their importance:***

- Airbags slow the speed of the driver's motion forward.
- Airbags absorb the energy of the passengers on collision.

**G.R → Airbags deflate quickly after few seconds of collision.**

- Because they contain small holes (vents), through which the gas comes out, so the driver can get out of the car.

## Collisions between trains and cars:



- There are many accidents in which a train hits a car that may be stuck on the train tracks.
- Trains are mush larger than cars. Also, trains can travel at a high speed.
- It is more dangerous, as the force of the collision between the car and train increases.

## …class work…

### Choose the correct answer :-}

1. The object that has the most kinetic energy, is ……………. Object.
   a. the fastest and lightest c. the slowest and lightest
   b. the fastest and heaviest d. the slowest and heaviest
2. A wrecking ball is made of …………………. .
   a. plastic. b. nylon. c. steel. d. wood.
3. When objects collide with each other, ………… is transferred between them.
   a. Time b. distance c. energy d. nothing
4. In cricket game, the bat transfers its …………. Energy to the ball.
   a. Kinetic b. potential c. chemical d. thermal
5. Collisions usually produce………………… .
   a. solar energy. c. gravitational potential energy.
   b. sound energy. d. chemical potential energy.
6. When the cricket bat hits the ball, the ball direction ……………. And the ball speed…………………
   a. Changes – changes c. doesn't change – changes.
   b. Changes – doesn't change d. doesn't change – doesn't change
7. Seatbelts work when the car ……………………….. .
   a. decreases its speed gradually. c. suddenly stops
   b. increases its speed gradually. d. stops gradually
8. If there is nothing to stop a moving object, this object will ………. .
   a. stay in motion. c. stop after few minutes
   b. stop after few hours. d. stop after few seconds.
9. Airbags in the car are folded into all the following places, except …………. .
   a. Steering wheel b. doors c. tires d. dashboard
10. When a car that moves forward stops suddenly, the passengers move …. .
    a. Backward b. upward c. downward d. forward

# ...Home Work...

## Put (True) or (False) ;-}

1. Seatbelt is one of the safety equipment in cars. ( )
2. After car collision, the airbags deflate as fast as they inflate. ( )
3. A fast and heavy object has more potential energy than a slow and light object. ( )
4. Airbags are made up of thick wooden material. ( )
5. During a crash between two cars, the potential energy transfers from the faster car to the slower one. ( )
6. When a cricket bat hits the ball, its potential energy transfers to the ball. ( )
7. Football is used to collide with buildings to knock down their walls. ( )

## Give reasons for ...?

1. Airbags in cars are very important.

......................................................................................................................

2. Seatbelts in cars are very important.

......................................................................................................................

3. The speed of the ball increases when the bat hits it hard.

......................................................................................................................

## What happens if...?

- Airbags in a car don't inflate during a crash.

......................................................................................................................

# ...lesson two...

## ...Basics of Speed...

***Basics of speed:***

Speed is a measurement of how fast something is moving.

***Speed:***

It is the distance that an object travels in certain amount of time.

Calculating the speed:

- To calculate the speed of any moving object, we can divide the distance that the object moves by the time taken to travel that distance as:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Distance →(measured in kilometer or meter)

Time →(measured in hour or second)

So, we can define speed also as, distance per unit time.

The measuring unit of speed may be:

Kilometer per hour (km/hr)

Meter per second (m/sec)

**The speed of an object is not affected by the direction of this moving object.**

***Example:***

If a car moves forward 5 meters in one second, then it moves backward 5 meters in one second, so its speed is still 5 meters per second.

***Problems:***

1. Karim runs 100 meters in 20 seconds. Calculate the speed of Karim.

Speed = distance ÷ time = 100 ÷ 20 = 5 m/sec.

2. If a bus traveled 600 kilometers in 2 hours. Calculate the speed of the bus.

Speed = distance ÷ time = 600 ÷ 2 = 300 km/ hr.

## ...Try By Yourself ...

- A train travels from Cairo to Alex in a distance of 200 kilometers in 2 hours. Find its speed.

.............................................................................................................

.............................................................................................................

**Note**

- As the speed of a moving object increases, its kinetic energy increases.
- Both speed and kinetic energy increases, as the angle of inclination increases.

## *Comparing the speed of two moving objects:-*

To compare the speed of two moving objects, we can use one of two ways:-

1. Measure the distance that both objects travel in **the same amount of time.**

- The object that travels **a greater distance** in the same amount of time is moving at a greater speed.
- Example:-

If two runners run for 1 hour, where:

- The first runner travels 6 kilometers.
- The second runner travels 9 kilometers.

So, the second runner is moving at a greater speed, because he travels a greater distance (9 km) in the same amount of time (1 hour).



2. Measure the time that both objects take to travel **the same distance.**

- The object that travels the same distance in **a smaller amount of time** is moving at a greater speed.
- Example:

If two cars are racing 120 kilometers, where:

- The first car reach the end line of race in 1 hour.
- The second car reach the end line of race in 2 hours.

So, the first car is moving at a greater speed, because it travels the same distance (120 km) in shorter time (1 hour).



## …Class Work…

**Choose the correct answer ☺**

1. How can we calculate the speed of an object?.................... .

a. Speed = distance ÷ time c. speed = distance × time
b. Speed = distance – time d. speed = distance + time

2. When the kinetic energy of a moving body …………., its speed …………. .

a. Increases – doesn't change c. decreases – doesn't change
b. Increases – increases d. decreases – increases

3. Which of the following is a measuring unit of speed ? …………… .

a. hr/km b. sec/m c. m/sec d. kg/sec

5. If the angle of inclination of a hill increases, the kinetic energy of an object moving down it will …………………….. .

a. Increase b. decrease c. be destroyed d. remain as it is

# ...Home Work...

**Put (True) or (False) ;-)**

1. We can measure the covered distance in kilometer unit. ( )
2. The angle of inclination of a ramp affects the speed of an object moving on it. ( )
3. When two similar objects moves with the same speed, they have different kinetic energies. ( )
4. The speed is distance per unit time. ( )
5. When the speed of an object increases, its kinetic energy decreases. ( )
6. If two objects cover the same distance in the same time so, they have similar speed. ( )
7. When Loreen runs 50 meter in 10 seconds, her speed is 500 m/sec. ( )

**What happens if** The speed of a car increases. ( according to its kinetic energy)

……………………………………………………………………………………………………

- **Find the speed of a runner, if you know that he covers 400 meters in 80 second.**

……………………………………………………………………………………………………
……………………………………………………………………………………………………

**Give reasons for….?**

- The speed of a truck is more than that of a small car when both of them roll down on the same ramp.

……………………………………………………………………………………………………
……………………………………………………………………………………………………

# …lesson three…

## …Energy and Collisions…

***Energy and Collisions:***

- When you and your friend crash with each other, we can say a collision happens between both of you.

***Collision:***

It is the bumping or crashing of two objects into each other.

**When two objects collide with each other:**

- An amount of energy transfers between them.
- Changes of energy occur.

***Example of collision between two objects:***

→What happens if you are running down the street without looking in the front of you and hit a traffic sign post?

◊ In this situation:

- You will stop moving forward.
- You may bounce off and get hurt.
- The traffic sign post may vibrate.




→ In the previous example, what are the changes and transfer of energy that take place?

- The kinetic energy transfers from your body to the traffic sign post.

This leads to the vibration of the traffic sign post.

- A part of your kinetic energy changes into a sound energy ( The sound you hear on collision).

***What happens if…?‼***

1. Two cars move at different speeds in opposite direction collide with each other?

→ The forces exerted in the accident depend on the speed of both cars, so damage would be more stronger because they move in opposite direction.



2. Two cars move at different speeds in the same direction collide with each other?

→ the force exerted in the accident depend on the speed of both cars, this leads to damage that would be less stronger because they move in the same directions.



# …The effect of speed on collision…

- We learned that as the incline of the ramp increases, the speed of the object increase.

***The amount of kinetic energy of moving object depends on:-***

**(The mass of object)** **(The speed of object)**

***Now, we will study the effect of speed on collisions.***

**→When a fast object crash into another object, the faster object transfers some of its energy to the other object, where:**

- **By increasing** the speed of **the object**, the **energy** that transfers during collision will **increase.**
- Some of this transferred energy may be in the form of **heat, light or sound**

● ***Comparison between a fast-moving object and a slow-moving object:***

| Fast-moving object | Slow-moving object |
|---|---|
| It has **more energy.** | It has **less energy.** |
| When this object hits another object, it exerts **more force.** | When this object hits another object, it exerts **less energy.** |
| This force cause a **big damage** to the object that cannot be repaired. | This force cause **less damage** to this object than the fast-moving object. |

***Driving fast is very dangerous, because if a car increases its speed, its kinetic energy increases that results in exerting a large force during an accident.***

## …Class Work…

**Put (True) or (False) ;-]**

1. A slow and light object has much kinetic energy. (   )
2. You have to drive a car as fast as possible, because at high speeds you can avoid collision. (   )
3. A slow-moving object has more energy and force than that of a fast-moving object.(  )
4. When you collide with an object a part of your kinetic energy may changes into sound energy. (   )
5. On collision, energy is created and change. (   )
6. When you drive on high speed, the kinetic energy increases. (   )

# …Home work…

**Choose the correct answer :-}**

1. When the speed of a moving object increases, the energy that transfers during its collision will …………….. .
a. Increase c. not change
b. Decrease d. equal zero
2. A fast-moving object has...........that of a slow-moving object.
a. the same energy as c. less energy than
b. No energy as d. more energy than
3. The two factors affecting the kinetic energy of an object are ………… .
a. Its speed and the color c. its speed and the mass
b. Its mass and the color d. its light and the sound energies
4. As the mass of a vehicle increases, it needs …………. To …………… .
a. less force - less potential energy. c. less force - less kinetic energy
b. More force - more potential energy. d. more force – more kinetic energy
5. When two objects of the same mass move with the same speed collide with each other, the resulted damage ………………… .
a. is larger in one of them and smaller in the other.
b. is equal in both of the two objects.
c. doesn't depend on the mass of the two objects.
d. doesn't depend on the speed of the two objects.
6. On collision, energy is ……………… .
a. created. c. created and transferred.
b. destroyed. d. transferred and change.
7. When car and truck collide with each other in opposite directions, ……….. .
a. the car has more energy and cause more damage.
b. the truck has more energy and cause more damage.
c. the car has less energy and cause more damage.
d. the truck has less energy and cause less damage.
8. All the following factors affect the kinetic energy of a moving car, except…..
a. the mass of the car.
b. the pushing force of the car engine.
c. the airbags inside the car.
d. the inclination of the road on which the car moves.

# ...Lesson Four...

## ...Speed and Collision...

- As the force on an object increases, its speed and the amount of its kinetic energy increase.
- As the kinetic energy of a moving object increases, more damage will happen to this object during collision.

## ...The Effect of Mass on Collision...

***The relation between the mass of objects and their kinetic energy:***

Different vehicles have different masses, where a large truck has a much greater mass than a car.

- If a large truck is traveling at the same speed of car, the truck has more kinetic energy than the car, so the truck needs a bigger engine than the car.
- As the vehicle moves faster, the amount of fuel that burns inside its engine increases to provide it with more kinetic energy.
- As the mass of an object increases, its kinetic energy increases.

**We can conclude that if the truck and the car move at the same speed, we will find that:**

***The truck:***

- Has a big mass , big engine
- Use more fuel
- Has more kinetic energy

***The car:***

- Has a small mass , small engine
- Use less fuel
- Has less kinetic energy



***Give a reason :-***

- **The truck whose mass is 1 ton has half the kinetic energy of another truck that has mass 2 tons when they both move at the same speed.**

→ Because if the mass of an object increases, its kinetic energy at the same speed also increases.

***The effect of mass on collisions:***

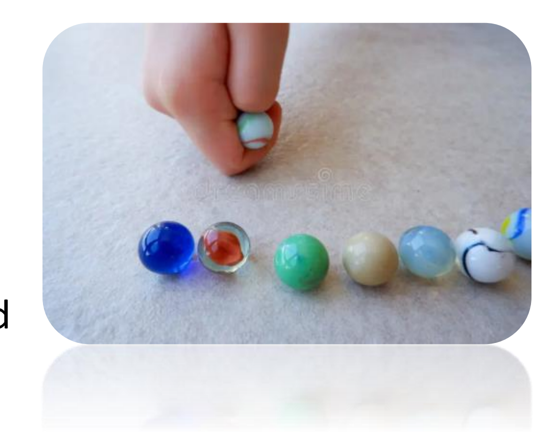
- A large-mass vehicle causes more damage when it hits something than a small-mass vehicle traveling at the same speed.

***What happens if...?***

1. **A bicycle moving at a speed of 50 km/hr hits a person.**
   The bicycle will cause some injuries to this person, but he will survive.
2. **A car moving at a speed of 50 km/hr hits a person.**
   The life of this person may be endangered.

# ...Energy Conversions During a collision...

We know that when two objects collide with each other, transfer and changes of energy take place such as:



- When you play a game with marbles, kinetic energy is transferred from your hand to the first marble, then there is another transfer of energy from your marble to the ones you hit.

- Some of the kinetic energy is changed into sound energy when you hear the click sound during collisions between marbles.

## Energy conversions during a collision of Newton's cradle:

1. When Newton's cradle ball is raised up without leaving it go, It stores potential energy and doesn't have any kinetic energy.



2. When you leave the ball to move in the direction of the rest ball, the potential energy decreases gradually and changes into kinetic energy.



3. Most of kinetic energy in the Newton's cradle is transferred from the first ball to the rest of balls, so the number of balls moving on both sides is equal.



- Some of kinetic energy of the first ball is changed during collision into:-

| 1. Sound energy | 2. Thermal energy | 3. Other forms of energy |
|---|---|---|
| Some of this kinetic energy changes into sound energy that is produced during the collision between balls. | Some of this kinetic energy changes into thermal energy that is produced due to the friction between the string and the other parts of Newton's cradle and also during collision between balls. | Some of this kinetic energy changes into other forms of energy due to the friction of air with the ball during its movement. |

## ...Class Work...

### Choose the correct answer :-}

1. A very big truck needs ………… To move.
   a. very small engine b. very big engine c. small engine d. no engine

2. As the force that acts on an object increases, its ability to do work ……….
   a. Increases b. decreases c. doesn't changed d. destroyed

3. The amount of fuel that is used in a big truck to produce a certain amount of kinetic energy is ………… the amount of fuel in a small car to get the same amount of kinetic energy.
   a. Less than b. more than c. equal to d. half to

4. On a flat road, if a large truck is traveling at the same speed of a small car, then the truck has ……………… .
   a. More kinetic energy. c. the same kinetic energy of the car.
   b. Less kinetic energy. d. no kinetic energy at all.

5. When a car stops, all the following become zero, except ……………… .
   a. speed. b. kinetic energy. c. mass. d. work

6. If two objects collide with each other, the energy after collision is ………….. the energy before collision.
   a. Equal to b. double c. triple d. half

7. When two balls are pushed away at the left side of Newton's cradle, this happens as a result of collision of …………………. From the right side.
   a. One ball b. two balls c. three balls d. four balls

### Put (True) or (False) :-{

1. The force that acts on an object doesn't affect its speed. (   )

2. The smaller the mass of the vehicle, the less fuel it consumes. (   )

3. Objects of equal masses are the factors that affect the kinetic energy of a moving object. (   )

# …Home Work…

**Arrange the following sentences to show the steps of collision of newton's cradle balls in the correct order:-**

(…..) Kinetic energy is transferred from the first ball to the rest of balls.

(…..) Potential energy of the first ball decreases and changes into kinetic energy

(…..) Kinetic energy of all balls decreases gradually until they stop.

(…..) Raise up the first ball, so it stores potential energy.

**What happens if…?**

1. The kinetic energy of a moving car increases.

…………………………………………………………………………………………………………………..

2. You let the ball of newton's cradle move towards the rest of balls.

…………………………………………………………………………………………………………………..

3. A truck and small car move at the same speed.

…………………………………………………………………………………………………………………..

**Give reasons for …?**

1. You can hear a sound during collision between marbles.

…………………………………………………………………………………………………………………..

2. A car consumes less fuel than that consumed in a bus to move at the same speed.

…………………………………………………………………………………………………………………..



# Final Examinations of some governorates

## on the first term 2023

## 1 Cairo Governorate — New Cairo Educational Zone

**1 (A) Complete the following :**

1. Fireflies use the sense of .................... to communicate with each other.
2. .................... and .................... are from sharp senses in owls.
3. In electric heater, .................... energy changes into .................... energy.
4. A ball at the top of a hill stores .................... energy.

**(B) Give a reason for the following :**

Dolphin can hear all kinds of sound.

..........................................................................................

..........................................................................................

**2 (A) Write the scientific term :**

1. One of the safety equipment in the car. (..........................)
2. It is the visible form of energy. (..........................)
3. It is a type of force that makes objects move away from you. (..........................)
4. It is a tree that is found in snow and has a triangle shape. (..........................)

**(B) Compare between :**

| Point of comparison | Polar bear | Forest bear |
|---|---|---|
| Fur color : | .................................... | .................................... |

**3 (A) Choose the correct answer :**

1. Reading and writing are common types of communication in .................... world.
   a. humans  b. animals  c. birds
2. .................... are animals that become active at night.
   a. Reptiles  b. Amphibians  c. Nocturnal animals
3. The friction force produces .................... energy.
   a. thermal  b. chemical  c. electrical
4. When a car stops suddenly, the passengers move ....................
   a. forward.  b. upward.  c. downward.

**(B) What happens if ...?**

Animals can't adapt in their environment.

..........................................................................................

## 2 Cairo Governorate — East Nasr City Educational Zone

### 1 (A) Choose the correct answer :

1. Reading and writing are common types of communication between ..................
   a. animals. b. humans. c. plants. d. birds.
2. When an object is in motion, this means that its .................. changes.
   a. color b. shape c. position d. size
3. Which of the following can turn its head in all directions ..................
   a. lizards. b. owls. c. cats. d. cow.
4. When you move something toward you, this represents ..................
   a. pulling force. b. light energy. c. pushing force. d. sound energy.

### (B) Write the scientific term :

The objects which allow light to pass through them. (........................)

---

### 2 (A) Put (✓) or (✗) :

1. Seatbelt is one of safety equipment in cars. (  )
2. The ears of arctic fox are longer than those of fennec fox. (  )
3. Exhaled air carries oxygen. (  )
4. Gravity pulls objects downward. (  )

### (B) What is the type of adaptation ...?

Panther chameleon puffs up its body with air for defense.

..........................................................................................................

---

### 3 (A) Complete the following sentences using the words between brackets:

1. Fish breathe oxygen gas dissolved in water by .................. (skin – gills)
2. The organ that is responsible for sight .................. (eye – ear)
3. If the speed of object decreases, this means that its kinetic energy .................. (increases – decreases)
4. The form of energy that can be seen is .................. (light – sound)

### (B) What happen if firefly beetles want to communicate ?

..........................................................................................................

..........................................................................................................

## 3 Cairo Governorate — El-Sahel Educational Zone

**1 (A) Choose the correct answer :**

1. Animals that are active at night are called .................. animals.
   a. diurnal   b. nocturnal   c. endangered   d. extinct
2. The ability to rotate head in all directions is well-known in ..................
   a. owl.   b. jerboa.   c. snake.   d. dolphin.
3. There is a .................. force between the car's tires and the road that decreases its speed gradually.
   a. gravity   b. friction   c. push   d. pull
4. .................. is the ability to do work or make a change.
   a. Speed   b. Work   c. Energy   d. Displacement

**(B) Mention the type of adaptation of fennec fox during its panting.**

This type of adaptation is .................. adaptation.

**2 (A) Match :**

| (A) | (B) |
|---|---|
| 1. Kapok | a. is the covered distance in a unit of time. |
| 2. Jerboa | b. grow in amazon rainforest. |
| 3. Potential energy | c. it hops in zigzag path. |
| 4. Speed | d. is the stored energy in the object due to its position. |

1. ..................  2. ..................  3. ..................  4. ..................

**(B) Mention the importance of gills for fish.**

..............................................................................................

**3 (A) Correct the underlined words :**

1. The eye pupil in human open <u>wider</u> than that in the nocturnal animals. (..................)
2. <u>Stomach</u> is the main control center in the human body. (..................)
3. The kinetic energy increases by increasing <u>the height</u> of the moving object. (..................)
4. <u>Pushing</u> force of gravity makes the ball falls down after throwing it in air. (..................)

**(B) Write a name of an animal that lives in water and communicate by songs.**

..............................................................................................

## 4 Cairo Governorate — Al Salam Educational Zone

**1 (A) Complete the following senteneces using these words :**

(acacia tree – energy – pushing – hearing)

1. Blind people can locate his friend by .................. sense.
2. It is the ability to do work and it can change from one form to another is called ..................
3. From plants that have a long root that grows directly downward to search for water as deep as 35 meter below the soil surface ..................
4. There are two forces that affect on a moving object which are .................. and pulling forces.

**(B) Who am I ...?**

An insect that depends on smell sense when there is a shortage of food or if there is a danger nearby.

..................................................................................................................................

**2 (A) Put (✓) or (✗) :**

1. From the examples of kinetic energy, the bird which stays in its nest. (   )
2. We can determine the sound pitch by smelling sense. (   )
3. The moon is a source of light, as it reflects sunlight. (   )
4. The stopping object can't move until a force acts on it. (   )

**(B) Write the scientific term of each of the following :**

A reptile that its body is covered by colored scales and has v-shaped feet. (........................)

**3 (A) Choose from column (A) when suits it in column (B) :**

| (A) | (B) |
|---|---|
| 1. Diaphragm | a. gravity force. |
| 2. Kinetic energy | b. has a role in respiration. |
| 3. The force that attracts bodies toward the Earth | c. airbag. |
| 4. From safety equipment in cars | d. it can be transformed into potential energy. |

1. .................. 2. .................. 3. .................. 4. ..................

**(B) A train travels from Cairo to Alexandria in a distance of 200 kilometers in 2 hours. Find its speed.**

..................................................................................................................................

## 5 Giza Governorate — Abou El Nomros Educational Zone

### 1 (A) Choose the correct answer :

1. Animals that become active at night are called .................... animals.
   a. nocturnal  b. diurnal
   c. extinct  d. endangered
2. When the force acting on a moving body increases, its speed will ....................
   a. increase.  b. decrease.
   c. remain constant.  d. stop.
3. Push or pull actions are considered as types of ....................
   a. force.  b. device.  c. energy.  d. adaptation.
4. The energy that is stored in an object due to its position, is known as .................... energy.
   a. kinetic  b. potential  c. sound  d. light

### (B) Classify the following into (structural and behavioral adaptation) :

1. V-shaped feet of panther chameleon. (........................)
2. Sending a smelly message from acacia tree to other trees. (........................)

---

### 2 (A) Put (✓) or (✗) :

1. Whales can communicate with each other by using songs. (  )
2. Gravity is the force that pulls objects downward to the Earth. (  )
3. Digestion process begins in stomach with the help of saliva. (  )
4. Kilogram is the measuring unit of speed. (  )

### (B) Cross out the odd word :

Penguin – Fennec fox – Polar bear. (........................)

---

### 3 (A) Complete the following using the words between brackets :

(Glass – Energy – Car seatbelt – Brain)

1. .................... is a safety equipment that is used to prevent car passengers from moving forward when the car stops suddenly.
2. .................... is considered an example for transparent materials.
3. .................... is an organ in the nervous system.
4. .................... is the ability to do work.

### (B) Write the scientific term :

A body that appears lighted in the sky at night, but it is not considered as a source of light. (........................)

## 6 Giza Governorate — 6th October Educational Zone

### 1 (A) Choose the correct answer :

1. Bull sharks can live in ....................
   a. fresh water. b. salt water. c. both.
2. Speed is a measurement of how .................... something is moving.
   a. long b. fast c. tall
3. .................... is a behavioral adaptation in acacia tree.
   a. Very long root b. Sharp spines c. Production poison
4. A ball at the top of the hill stores .................... energy.
   a. potential b. sound c. kinetic

### (B) Give a reason for the following :

A mirror can reflect the light better than a painted surface.

..........................................................................................................................................

..........................................................................................................................................

### 2 (A) Put (✓) or (X) :

1. Bats use their sense of smell to avoid dangers. ( )
2. The brain is responsible for processing information. ( )
3. Energy can be changed from one form to another. ( )
4. Gravity force is an upward pulling force. ( )

### (B) Write the function of the teeth :

..........................................................................................................................................

### 3 (A) Choose from column (B) what suits it in column (A) :

| (A) | (B) |
|---|---|
| 1. Its body is covered with thick fur | a. food. |
| 2. It makes the food soft | b. polar bear. |
| 3. Human needs energy from | c. owl. |
| 4. has a bowl shaped face | d. saliva. |

1. .................... 2. .................... 3. .................... 4. ....................

### (B) What happens if ...?

A speed of a car increases. (according to its kinetic energy).

..........................................................................................................................................

## 7 Giza Governorate — Science Inspectorate

**1 (A) Choose the correct answer :**

1. The potential energy of an object, depends on ..................
   a. its mass only. b. its height from the Earth's surface only.
   c. its mass and its height from the Earth's surface.
   d. its temperature.
2. .................. is considered as a behavioral adaptation in the panther chameleon.
   a. Puffing up its body during danger
   b. Each eye can move independently
   c. V-shaped feet. d. Long sticky tongue.
3. From the structural adaptation of water lily plant is that ..................
   a. it has long roots. b. it has tiny leaves.
   c. it has sharp spines. d. it has wide leaves.
4. All of the following are examples of motion, <u>except</u> ..................
   a. a running person. b. a ball travelling through the air.
   c. a flying bird. d. a sleeping dog.

**(B) Write the scientific term :**

The organ responsible for processing information transmitted to it, then send messages to the sensory organs. (........................)

**2 (A) Correct the underlined words :**

1. The <u>balanced</u> forces cause the object to move. (........................)
2. When you turn on a radio, the electrical energy changes into <u>light</u> energy. (........................)
3. <u>Moon</u> is considered as a source of light. (........................)
4. The system that breaks down food into a simpler form is <u>the respiratory</u> system. (........................)

**(B) Give a reason for the following :**

Kapok tree has hand-shaped leaves

..........................................................................................................................

**3 (A) Put (✓) or (✗) :**

1. Digestion process begins in stomach with the help of saliva. (   )
2. Speaking, writing are ways to communicate with people. (   )
3. Hitting a tennis ball needs a pulling force. (   )
4. The bus that covers 60 kilometers in 1 hour has a speed = 60 m/sec. (   )

**(B) Cross the odd word out :**

Eyes – Nose – Skin – Taste. (........................)

## 1 (A) Choose the correct answer :

1. .................... passes the food from pharynx to stomach.
   a. Esophagus b. Stomach c. Trachea d. Alveoli
2. Paper and wood are .................... materials.
   a. opaque b. transparent c. liquids d. gaseous
3. Penguin's feet have blood vessels that bring .................... from up to his feet.
   a. warm blood b. cold blood c. warm water d. cold water
4. .................... produce high pitched sound during winter.
   a. Owls b. Humpback whales
   c. Toads d. Salamanders

### (B) Cross the odd word :

Nose – Trachea – Stomach – Lungs. (........................)

---

## 2 (A) Choose from column (B) what suits it in column (A) :

| (A) | (B) |
|---|---|
| 1. Water lily | a. its habitat is salt water. |
| 2. Kapok tree | b. its habitat is fresh water. |
| 3. Pine tree | c. its habitat is Amazon rainforest. |
| 4. Mangrove tree | d. its habitat is snow. |

1. ........................ 2. ........................ 3. ........................ 4. ........................

### (B) Write the scientific term :

Ants send a smelly message to alert the ants where to find the food.
(........................)

---

## 3 (A) Put (✓) or (✗) :

1. In the electric fan, the electrical energy changes into kinetic energy. (   )
2. The fennec fox has short ear. (   )
3. Potential energy is the energy of moving body. (   )
4. Light travels in straight lines. (   )

### (B) Give a reason for the following :

The body of chameleon is covered with colored scales.

..........................................................................................

## 9 Alexandria Governorate — Middle Alexandria Educational Zone

**1 (A) Complete the following sentences using the words below :**

(Acacia tree – oxygen – mouth – sound)

1. In electric bell, electrical energy changes into .................... energy.
2. Digestion of food starts in the ....................
3. Fish breathe .................... gas which dissolved in water.
4. .................... has taproot to search for water.

**(B) Give a reason for the following :**

Wood is considered as an opaque material.

..........................................................................................................................................

**2 (A) Put (✓) or (✗) :**

1. When a car crashes into a wall, it will not stop. (   )
2. We eat food to obtain energy. (   )
3. Amphibians include frogs and salamanders. (   )
4. Black bears have dark fur to hide among trees. (   )

**(B) Cross the odd word out :**

Taste – Smell – Hearing – Eyes. (........................)

**3 (A) Choose the correct answer :**

1. When an object moves down a ramp, its stored potential energy ....................
   a. increases. b. doesn't change.
   c. changes to a less active form of energy.
   d. changes to a more active form of energy.
2. The form of energy that can be seen is ....................energy.
   a. thermal b. electrical c. sound d. light
3. Which of the following can turn its head in all directions ? ....................
   a. Lizard. b. Cat. c. Owl. d. Snake.
4. When an object is in motion, this means that its .................... changes.
   a. position b. shape c. color d. volume

**(B) Write the scientific term :**

The ability to do work. (........................)

## 1 (A) Choose the correct answer :

1. The body of arctic fox covered with ..................
   a. skin. b. thick fur. c. feathers. d. scales.
2. The ability to do work is ..................
   a. energy. b. force. c. pull. d. push.
3. Fish breathe oxygen dissolved in water by ..................
   a. lungs. b. gills. c. skin. d. fins.
4. By increasing the speed of moving object, the kinetic energy will ..................
   a. increase. b. decrease. c. still constant. d. be slower.

### (B) What is the importance of sharp spines in the desert plants ?

..........................................................................................

..........................................................................................

## 2 (A) Put (✓) or (✗) :

1. Both human and animal need light to see. ( )
2. Respiratory system is the system responsible for entering air to the body. ( )
3. Speed is the physical quantity measured by kilogram. ( )
4. Objects fall down to the Earth due to friction force. ( )

### (B) In your opinion, which of the following has thick fur ? and why ?

Dogs live in cold weather **or** dogs live in hot weather.

..........................................................................................

..........................................................................................

## 3 (A) Complete the following sentences :

1. Eyes send message to .................. through nerves.
2. The energy which is stored in a ball at the top of a hill is .................. potential energy.
3. The force that causes falling objects toward the Earth is .................. force.
4. When the fuel runs out, the car decreases it's speed due to .................. force.

### (B) Give a reason for the following :

Bats can't see at night but it can hunt the prey.

..........................................................................................

## 11 Menofia Governorate — Sers El Layyan Official Language School

**1 (A) Choose the correct answer :**

1. Which of the following is a measuring unit of speed ? ..................
   a. hr/km. b. sec/m. c. kg/sec. d. m/sec.
2. The ability to do work is ..................
   a. energy. b. force. c. push. d. pull.
3. The chemical energy stored in batteries is considered a form of ..................
   a. potential energy. b. kinetic energy. c. heat energy. d. light energy.
4. An animal that has the ability to turn its head in all directions is ..................
   a. snake. b. jerboa. c. dolphin. d. owl.

**(B) Calculate the speed of a train that covers 600 kilometers in a time of 6 hours.**

..........................................................................................

..........................................................................................

**2 (A) Put (✓) or (✗) :**

1. Wood is a transparent object that allows light to pass through it. ( )
2. The moon is a source of light. ( )
3. Some animals can see clearly at night. ( )
4. Exhaled air carries carbon dioxide. ( )

**(B) Give a reason for the following :**

Fennec fox has long ears.

..........................................................................................

..........................................................................................

**3 (A) Complete the following sentences choosing the correct word in the brackets :**

(Wood – gills – Eye – Mangrove)

1. .................. is the organ that we can use to receive light.
2. .................. is an opaque object.
3. Fish have .................. to breathe.
4. .................. tree has long and strong roots to resist water waves.

**(B) Give examples for :**

Objects that are sources of light.

..........................................................................................

..........................................................................................

## 12 Suez Governorate — South Educational Zone

### 1 (A) Choose the correct answer :

1. .................... has the ability to turn the head in all directions.
   a. Snake b. Jerboa c. Dolphin d. Owl
2. All of the following are components of nervous system, <u>except</u> ....................
   a. spinal cord. b. heart. c. nerves. d. brain.
3. The form of energy that can be seen is .................... energy.
   a. thermal b. electrical c. light d. sound
4. The force that is found between a moving car and the ground, which opposes its movement is known as ....................
   a. pushing force. b. electrical energy.
   c. magnetic energy. d. friction force.

**(B) Give a reason for the following :**

The inhaled air is different from the exhaled air.

.......................................................................................................................................

### 2 (A) Put (✓) or (✗) :

1. We can see the movement of electricity through a wire. (   )
2. Thick white fur is an adaptation in bears that live in polar regions. (   )
3. As the height of an object from the Earth's surface increases, its potential energy decreases. (   )
4. Hitting a tennis ball needs a pulling force. (   )

**(B) What happens when the light falls on a smooth and shiny surface as mirror ?**

.......................................................................................................................................

### 3 (A) Complete the following sentences using the words below :

(bats – increases – unbalanced – amphibians)

1. When the speed of an object increases, its kinetic energy ....................
2. Echolocation is used by some animals as ....................
3. Any object moves from its place when the forces acting on it are ....................
4. Pollution of water causes a great problems for ....................

**(B) Give one example for :**

1. A transparent material.

.......................................................................................................................................

2. An opaque material.

.......................................................................................................................................

## 13 Minia Governorate — Samalout Educational Zone

**1 (A) Put a sing (✓) or a sign (✗) to the following statements :**

1. The force that attracts objects down to the Earth is called pushing force. ( )
2. Unbalanced forces cause a change in the object position. ( )
3. Thermal energy is an example of kinetic energy. ( )
4. We can measure the covered distance in kilometer unit. ( )

**(B) Circle the different word :**

Fire – The moon – The Sun – The light bulb.

---

**2 (A) Complete the following sentences with a suitable word :**

1. When the mass of an object increases, so its kinetic energy ..................
2. The long ears of the fennec fox are example of .................. adaptation.
3. The energy that is stored in an object is called .................. energy.
4. Humpback whales communicate with each other with their .................. senses.

**(B) What happens when ...?**

The diaphragm muscle contracts and moves down.

..............................................................................................................................

..............................................................................................................................

---

**3 (A) Choose the correct Answer from the following :**

1. One of the adaptations that helps the animal to protect itself from enemies ..................
   a. camouflage. b. extinction. c. reproduction.
2. All of the following is a component of the nervous system, except ..................
   a. brain. b. spinal cord. c. heart.
3. Ability to do work is ..................
   a. energy. b. pull. c. push.
4. The speed of a car that travels 300 kilometer in 3 hours is .................. km/hr.
   a. 150 b. 50 c. 100

**(B) Give a reason for the following :**

The polar bear has thick white fur.

..............................................................................................................................

..............................................................................................................................

# 14 Sohag Governorate

## Sabry Abo Hussien Language School

**1 (A) Choose the correct answer :**

1. When you move something toword you, this represents ..................
   a. pushing force. b. light energy. c. pulling force. d. sound energy.
2. Collisions usually produce ..................
   a. solar energy. b. sound energy.
   c. gravitational potential energy. d. chemical potential energy.
3. In the electric lamp, electrical energy is changed into .................. energy.
   a. sound b. chemical c. light d. potential
4. The organ responsible for the sight sense is ..................
   a. the ear. b. the eye.
   c. the nose. d. the tongue.

**(B) Look at the path of the light rays in picture (A) and (B), then determine which of the two objects is opaque and which is transparent :**

Object (A) .................. Object (B) ..................

**2 (A) Put (✓) or (✗) :**

1. Dolphins have strong sight sense. ( )
2. Airbag absorbs the energy of the passengers during collision. ( )
3. The ears of arctic fox are longer than those of fennec fox. ( )
4. When a pen falls down from your hand, the acting force is the gravity. ( )

**(B) Answer the following :**

Jarboa have long and strong hind legs that help them to Jump quickly and escape in dangerous times. Determine the type of adaptation.

..................................................................................................

**3 (A) Complete the following sentences :**

1. .................. is the ability to do work.
2. Humpback whales communicate with each other through .................. sense.
3. By increasing the speed of an object, its kinetic energy ..................
4. Fish respire .................. dissolves in water.

**(B) Cross out the odd word :**

Penguin – Polar bear – Snake – Arctic Fox. (......................)

## 15 Luxor Governorate — Abu Bakr Official Language School

### 1 (A) Choose the correct answer :

1. How can we calculate the speed of an object ? ....................
   a. Speed = distance ÷ time
   b. Speed = distance × time
   c. Speed = distance + time
   d. Speed = distance – time
2. When you throw a ball in the air, the gravity will make it move ....................
   a. upward.
   b. forward.
   c. downward.
   d. backward.
3. The organ which stores solid wastes until it is released outside body is ....................
   a. stomach.
   b. small intestine.
   c. large intestine.
   d. anus.
4. The chemical energy stored in batteries is considered a form of ....................
   a. potential energy.
   b. kinetic energy.
   c. thermal energy.
   d. light energy.

### (B) A roller coaster moves from up to down (Explain the energy changes) :

..........................................................................................................................................

..........................................................................................................................................

### 2 (A) Match between column (A) and column (B) :

| (A) | (B) |
|---|---|
| 1. Motion | a. the ability to do work. |
| 2. Work | b. the change in object position relative to a fixed point. |
| 3. Energy | c. the force that causes object to move. |
| 4. Gas oven | d. it converts chemical energy into thermal energy. |

1. ........................ 2. ........................ 3. ........................ 4. ........................

### (B) What happens if ...?

Diaphragm moves up in respiration process.

..........................................................................................................................................

### 3 (A) Write the scientific term :

1. Time taken by organism to respond to different information. (........................)
2. A form of energy that the object has due to its movement. (........................)
3. A heavy steel ball swings on a cable used in buildings destruction. (........................)
4. It covers the body of some bears to keep warm and blend in snow. (........................)

### (B) Give a reason for :

Airbag deflates after seconds of collision.

..........................................................................................................................................